DESIGN OF SOCIAL ARITHMETIC LEARNING (NETTO, BRUTO, AND TARA) IN VII GRADE WITH SNACK CONTEXT USING PMRI APPROACH

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Abstract

This research is the kind of design research that has purpose to produce learning path at netto, bruto, tara in seventh grade of junior high school using snack's context. In this research there are learning instruction series which is designed and developed according to the learning activities assumption that used is Pendidikan Matematika realistik Indonesia (PMRI). This research was done by 22 Junior High School students at VII grade as a research's subject by producing learning trajectory (LT) that will help the student to find out netto, bruto, tara by the using of activity series at learning process. At the informal stage, as the beginning activity, researcher serves several snacks that will be measured by the student. Next at the preformal stage, student will start to find the common from the activity that they had done. After that student will be able to change to the mathematic sentence as model of. The next stage is model for where student could find the netto, bruto, tara formula so at the formal stage student able to solve the questions that relate to the daily life.

INTRODUCTION

Social arithmetic is a kind of mathematics that has an important role in daily life (Malik: 2004). We often find the case of netto, bruto, or tara such as snack in our daily life. Arithmetic is also called as a figures that discuss about the characters of numbers, the basic skill of addition, subtraction, multiplication, division, draw the square root, net, gross , and tara (Harahap: 2010). Netto, bruto, or tara are parts of social arithmetic, in which the social arithmetic is selected as a topic in learning mathematics which is pointing on the role of mathematics towards the society. Nandasari (2013) said that the way to teach netto, bruto, or tara was by illustrating them into a story connected with field of trade on students' daily life. The facts showed that the students' difficulties in doing social arithmetic were related with the way to write what they knew and be questioned on the questions, and did not know how to sum up the result from the computation (Lestari, 2013).

Moreover, the low outcomes of students learning related with netto, bruto, or tara and generally about social arithmetic were caused by the teacher centred, the material did not related to their daily life, source of learning only use a single handbook, there was no teaching material that could help students resolving their problems, and also low students' mathematics communication skill. So it caused the characteristics of arithmetic learning process still conventional. Teachers gave the procedural teaching and the formulas followed with a set of questions without giving the students chance to be active in doing arithmetic (Oktavia, 2009). The learning process was teacher centred and it made students be passive. In short students just sat, heard, wrote, and memorized. These activities successfully made students felt bored.

Some efforts were done to solve the students' problems in learning, specially related with social arithmetic such as netto, bruto, or tara. The teacher could arrange the

students' learning activities based on the characteristics of the material that was taught by utilized the easy learning context, and familiar on daily life. Non conventional learning model is needed to be applied because it is opposite with the principles of curriculum 2016. In the curriculum implementation of mathematics for secondary education, problem-solving approach is focus on learning mathematics include covered problem with one solution, open problem with non single solution, and problem with more solutions. The minister of national education republic Indonesia Number 41 Year 2007 about the process standard to primary and secondary education, based on students' needs the teachers should accustom to develop the teaching materials, so one of the solutions was by applied the systematic approach to solve the problems or facing the challenges' in daily life.

The approach that could be used in this teaching and learning process was PendekatanMatematikaRealistik Indonesia (PMRI). PMRI approach was selected because it is mathematize of everyday experience and applied the mathematic in the daily life (Hadi, 2005). Moreover, in the process of teaching and learning, students should get a chance to reinvent the mathematic by teacher' guidance (Gravemeijer, 1994). One point learning mathematic by using PMRI approach was the human activities and mathematics must be related towards the daily context as the source of developed and as application through the process of horizontally or verticallymathematic (Zurkardi, 2000). The context that is usually used was real problem of students' daily life (Van De Heuvel, 2003). In this research, the researchers designed the learning process by using snack context as the starting point, after that designed Hypothetical Learning Trajectory (HLT) that consists of several activities to support learning social arithmetic. Based on the background, this research aimed to produce trajectory from the design of social arithmetic material (netto, bruto, or tara) on snack context towards VII grade students by using PMRI.

METHOD OF RESEARCH

This research used design research method to developed local instruction theory through the collaboration between researcher and teacher to increasing the quality of teaching and learning process (Gravemeijer& Van Eerde, 2009). The design research method that is used by the researcher was type validation studies which designed the material of netto, bruto, or tara by using snack with PMRI approach, and HLT guided the process of learning. HLT was the hypothetical strategy that is used by the students and the upcoming prediction, on a LembarAktivitasSiswa (LAS), RencanaPelaksanaanPembelajaran (RPP), Pre-test, and Post-test.

The application of this design research was a cyclical process of thought experiment and instruction experiment (Gravemeinjer, 1994; Sembiring, Hoogland and Dolk, 2010). The steps in design research according to Gravemeinjer& Cobb cited in Bakker, 2004 were preliminary design, design experiment (pilot and teaching experiment), and retrospective analysis.

This research took place in SMP Negeri 22 OKU, with 22 seventh grade students as the object of the research. The techniques for collecting the data were observation, interview, video recording, students' worksheets, and post-test.

Finding and Interpretation

This research produced learning trajectory on the material of netto, bruto, or tara in seventh grade of secondary students. There were two activities in this research:

3.1 First activity: "Observe and measure snack

The first idea in this activity was weigh the food include the packaging. Moreover, students determined the weight of food without packaging. After that, students determined whether there was a difference between the weight of the food include and without its packaging. Teacher asked students to read and discussed into group to did LAS 1. When students discussed, teacher guided to do the activities on LAS 1. Teachers came to each group to observe the discussion.

The first activity in LAS 1 started by showing the picture of snack, the researcher brought the real snack into the class and gave the scales to each group. The students asked to follow the instructions on LKS 1. This picture was the answer strategy of group 4 in answering the activities no 1 on LKS 1.
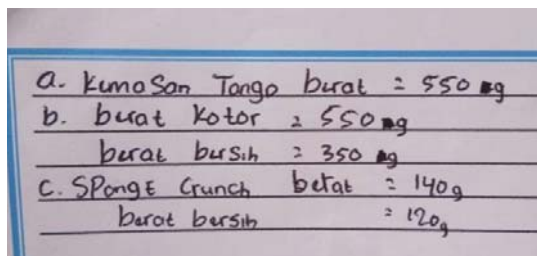

Figure 1. Answer strategy for question no 1

On the next question, the students answer the third question. On the third question, when the gross weigh on the right side of their table, each group had different snacks, but there were also some groups had the same snacks. The instructions were how you get the gross, net, and packing weight.
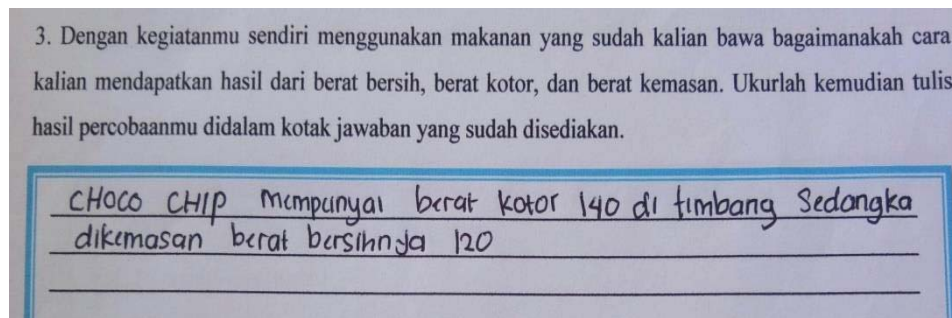

Figure 2. The answer for question no3 from the fourth group

Figure 3. The answer for question no 5 from the first group

For the question number 4, students filled the table based on the activities that has been done by them.

Nama Makanan	Dengan Kemasan	Tanpa Kemasan	Berat Kemasan
Roti Tango	550	350	200 g
Sponge Crunch	150	120	30 g
gery	150	130	20g

Based on students answer in table above, the students were guided to make a sum up, no matter the snacks; it is a must that the gross is always heavier than netto and tara.

The last activity on activity 1 was made a summary. Below are the students summary:

This learning process aimed to guide the students to understand the netto, bruto, and tara. The activities on this part were based on the questions on LKS activity 1.

3.2 Activity 2: "Resolve the problem related to net, gross, and tara"

On the second meeting, teacher announced the purpose of the study and the way how to learn such as by doing activity followed by question and answer session, group discussion, discussed and informed that they would work on group. Then, teacher asked students to sit on their own group and distributed LembarAktivitasSiswa (LAS) 2.

CONCLUSION

On teaching and learning process, the activity using the context of snack could help students in understanding netto, bruto, and tara. Snack context was the starting point on the learning process. Students asked to identify the problem by using snack. The first activity was measuring the snack by using scales. From the result of their activities, they made a model of mathematic and then wrote a conclusion.

By applying the contextual of students' daily life, snack, the students be more familiar with the problem given. Moreover, students were more motivated and interested to solve the problem, and it made the learning became more meaningful.

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