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DEVELOPING STUDENTS' UNDERSTANDING IN LEARNING LINEAR EQUALITY OF ONE VARIABLE THROUGH CONTEXT

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Abstract

The aim of this paper is how to develop the students' understanding in learning linear equality of one variable through context. It has mathematical problem that students could understand in learning linear equality of one variable. In this article, we will discuss one part of activity out of five activities that we have developed. This activity focused on how students could link the contextual problem into solving of the linear equality of one variable, especially on how to bring students understanding into formal form. The participants of this research were twenty-five students in class of VIIc MTs Diniyah Puteri Pekanbaru. The method of this research is design research. It has three phases consist of preparing of experiment, experimenting in the classroom, and conducting the retrospective analysis. While experimenting in the classroom, the collected data indicated that the students faced some difficulties. They could not understand while connecting the contextual problem into the formal form. Otherwise, the starting activity showed that they interested counting the datum of "Card Family". They interested to count and compare the datum and gave any strategies that we expected. The diversity of students' answering can be discussed with the other students to obtain the best result. The closing of experimenting classroom, students was guided to get formal form likely variable in mathematics and the equality.
Keyword: Linear Equality of one variable, design research, PMRI,

INTRODUCTION

Relating concept in mathematics was abstract, students should lead to invent the concept from their based understanding. Actually, students in junior high school have based logic thinking and manipulative physic from the real object. The varieties of the researches showed that the problem of the students is when the contextual problems were given then they could not lead their thinking. The teacher gave the formal mathematical form. Consequences, the teacher just explain to the students then the students write and use those symbolic without meaningful (Sembiring, 2006). The idea of the research how to facilitate the students understanding then develop it thorough the context. This research chooses Indonesian RME or PMRI as the method and design research as the research design. Mathematics must be connected to reality, stay close to children's experience and be relevant to society in order to be a human value (Van den Heuvel-Panhuizen, 1996).

Most of the contextual problems were not present the real conditional problem. Actually, contextual problem always was realistic problem. By using their understanding in elementary school, they could solve the problem and give any strategies that we were not imagining before. One of the activities that we are presenting now, it will talk about how to develop their understanding in learning the linear equality of one variable through context that namely "Card Family"

Interpreting of the context "Card Family" refers to the most of the straight contextual problem using form mathematical. Otherwise, when we gave the students the context, most of the students did not use the formal form. They gave informal form that related their thinking.

Providing of context "Card Family", it was as a means for instructional learning that is available. Because it provided table that consists of there are many columns that students could understand, then the students could interpret table to usefully, not only know the students' error, strategies, but also aimed those problem. This context is one way to gain meaning from the formal form in leaning the linear equality of one variable. Having completed this activity, it was expected the students could make generalized the equality of one variable into the formal form.
Considering the issued, this research was aimed to develop students' understanding in classroom activities, which RME underline its design, with using of context "Card Family" in learning linear equality of one variable for grade seven in junior high school.
We pose a research question " How can context support and develop the students' understanding in learning linear equality of one variable for grade seven in junior high school?"
The result of this research could be as the instructional theory in learning linear equality of one variable for grade seven in junior high school.

RESEARCH METHOD

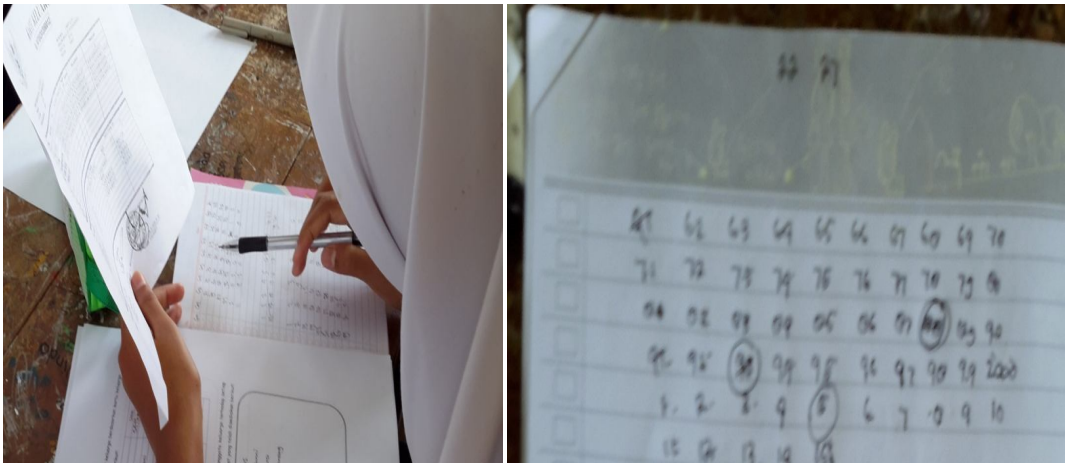
The main of this research is to develop student understanding while given instruction theory in learning linear equality of one variable. In this study, we are interested how the students can develop their understanding about algebra in primary school then they could link into linear equality of one variable. Therefore, a sequence of activities is to develop students understanding for grade seven of junior high school. For that is purpose, design research was chosen as an approach to answer the research question and achieve the goals. Design research is relevant for eduacational practice (Akker, Bannan, Kelly, Nieveen and Plomp, 2013).
Wang & Hannafin (in Simonson; 2006; Wijaya 2008) defined a design research as a systematic but flexible methodology aimed to improve educational practices through iterative analysis, (re)design, and implementation, based on collaboration among researcher and practitioners in daily life setting and leading to contextually-sensitive design principles and theories. There are three phases of conducting a design research. They were that preparing for the experiment, experimenting in the classroom and conducting the retrospective analysis. While preparing of the experiments phase, the researcher and teacher tried to make the Hypothetical Learning Trajectory (HLT). This consisted of sequences of instructional activities complete with mathematical goals, conjectures of students' thinking and action in classroom. Next step, experimenting in the classroom we link HLT between instructional theory and a concrete teaching experiment (Bakker, 2004). Finally, all the data while teaching and learning process were collected then has been analyzed. This step is called as retrospective analysis.
The participants for this research were twenty-five students in class of VIIc MTs Diniyah Puteri Pekanbaru. These participants were chosen cause that representative students. They had average level in mathematics.
In this research, the data such as video recording, students' working and field notes will be collected during the teaching experiments. These data will be used to investigate students' understanding and the students' learning processes will be observed through videotaping and participating observatory.
The data collected during experimenting in the classroom will analyze; like students' working, field notes, and video recording. We will compare the students' actual learning and the conjectured HLT. The analysis of the lessons will be done by analyzing the daily based on activities and analyzing the whole series of lessons. The reliability of this research were conducted by data triangulation; involving the videotaping of the activities, the students' working and field notes.

RESULT AND DISCUSSION OF THE RESEARCH

In designing activities for this research, the students could able to read the column in "Card Family" then compare each other's. It has been considered as a crucial point. Because column in "Card Family" is consist date, month and year birth. The students analyzed what is age each family in this year. Based on observation most of the students can realize the purpose of the

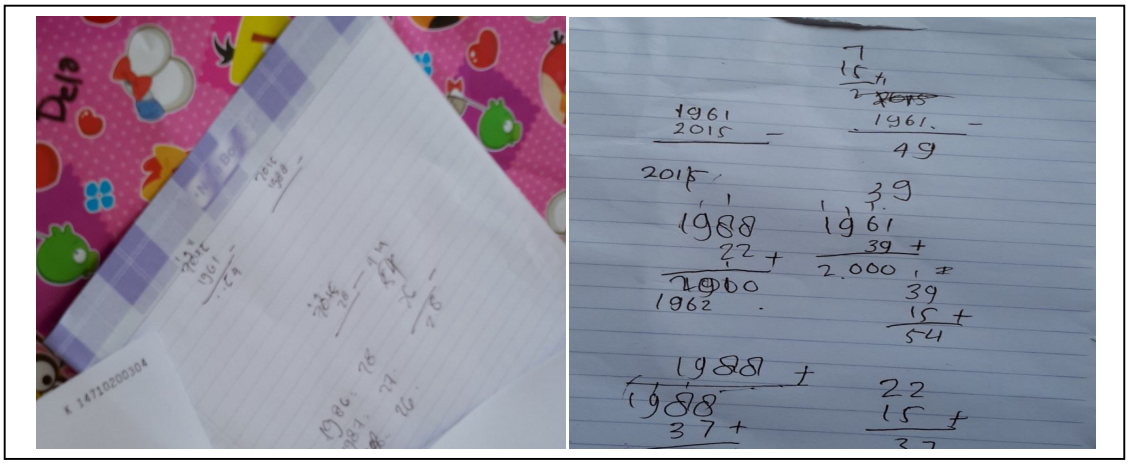
problem. Therefore, the general HLT has been designed. Some of the hypothetical could not be similar as learning process. Teacher made instruction the point who the father, mother and the first child. She said the purpose of her instruction to lead the students the right answers. Consequently, most of the group has the same answer.

Otherwise, we tried to looking for the students strategies. They given any strategies, we could look in picture 1. They tried to make array every year then tried to calculate it.



Picture 1. Students calculated the age based on arraying the year

Another student made calculation by using operation of subtraction. They used subtraction numbers. It was two answering their write. The first student used calculations this year subtract the father years, but the second student used calculation the father year subtract this year. Their idea was seen in this picture.

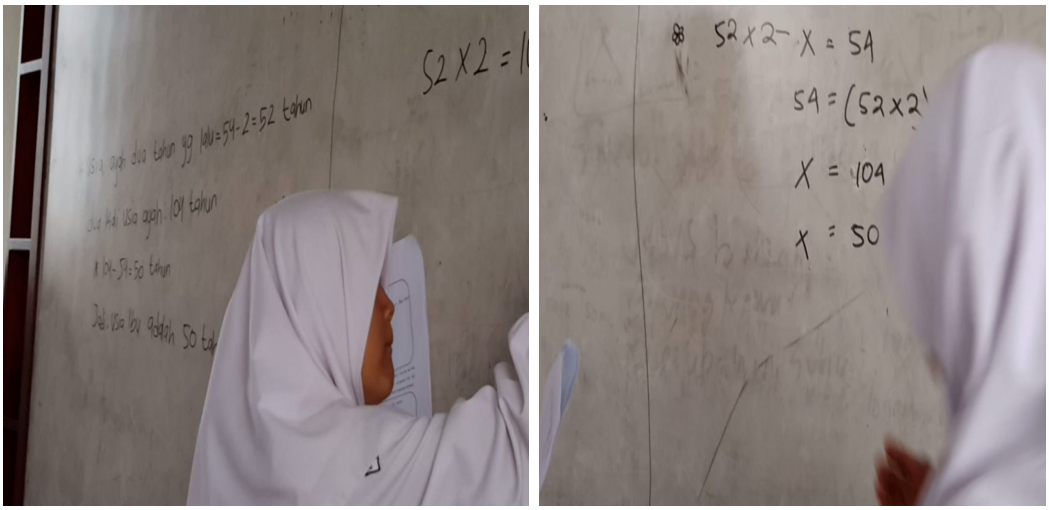


In picture 2, there were two answering the students about subtraction. They were made subtraction the year. The result of the subtraction was the ages. The students could realize that the ages were not minus. While we compare in their strategies and their writing in the worksheet, it was different. They said that the ages not minus but positive, so the answer is 64 not -64. They could realize in their life no minus in the ages.

The other students used their finger, they thought finger as a simple means calculation. They could know the sum number that was exactly without writing. While observation in learning process, with calculating finger could make discussion and cooperation. The interaction was built in this strategy.

The last problem of this activity is in one of HLT that students could able to generalize to formal form such as variable. Consequently, the students could not make into variable, they just

wrote directly answer. They could interpret the problem based their understanding. Otherwise, students were in level formal thinking, so that they wrote into variable.



then they could find the answering is faster than the formal form. It was conclude that they students understanding was developed while was given the context.

CONCLUSION AND SUGGESTION

From this research, it can conclud that the context, "Card Family", could support and develop the students to gain the meaning of the year and differences of the ages each family. Indirectly, there was also to think about social. The student's activities in learning process have developed, because they spent most of their time for an effective group and discussion. The principle of Indonesian of RME was established. By imaging the context, they could able develop their understanding then formal form. Although, most of the students had been given the informal form. We can conclude that the context could support and develop the students understanding in learning equality of one variable. It could be one of the instructional learning processes in junior high school.

REFERANCES

Akker, Jan van den., etc,. (2013). *Educational Design Research. Part A: An Introduction.* Editor: Tjeerd Plomp & Nienke Nieveen. Enschede. The Netherland.

Graveimejer, K. (2004). *Local Instructions Theories as Means of Support for Teacher in Reform Mathematics Education. Mathematical Thinking and Learning,* 6(2), 105-128. Utrecht University, The Netherland. Lawrence Erlbaum Associates.

Heuvel-Panhuizen, M. Van den. (1996). *Assessment and Realistic Mathematic Eduaction*. The Netherlands. CD--β Press. Utrecht

Sembiring, R.K. 2006. *PMRI tidak sekedar belajar matematika*. Majalah PMRI, Vol IV No.3 Oktober 2006, Hal 3.

Wijaya, Ariyadi. (2008). *Design Research in Mathematics Education Indonesian Traditional Games as Preliminaries in Learning Measurement of Length.* in Zulkardi (editor). Prosiding Konferensi Nasional Matematika XIV (halaman 731-738). Program Studi Magister Pendidikan Matematika Program Pascasarjana Universitas Sriwijaya.

Bakker, Arthur. 2004. Design Research in Statistics Education on Symbolizing and Computer Tools. CD-β Press. Utrecht, The Netherland.