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Realistic Mathematics Education Based on Virtual Network in Increasing the Understanding of Geometry Concept

Octarina Hidayatus Sholikhah^{1*}, Rasmita²

¹Universitas PGRI Madiun, Indonesia

²Universitas Putra Indonesia YPTK Padang, Indonesia

Corresponding Author: Octarina Hidayatus Sholikhah, octariana@unipma.ac.id*

ABSTRACT

This article was to improve the understanding of elementary school students' geometry concepts through the Realistic Mathematic Education (RME) model that assisted by virtual nets. This research was classroom action research. This research was conducted in two cycles where each cycle had two meetings. The research subjects were the fifth grade students. In this study two cycles were carried out where if the first cycle had not yet reached the specified indicators. It would be improved in the next cycle or the second cycle. Data collection techniques used tests and observations in each cycle. In the second cycle it was felt that the target had been reached, so that the study would end until the second cycle. At the pre-cycle stage obtained a classical percentage of 50%, the first cycle obtained a percentage of 70% and in the second cycle increased by 100%. Thus the researcher concludes that through the RME model assisted by virtual nets can improve the understanding of geometrical concepts of elementary school students.

Keywords: Virtual Network, Realistic Mathematics Education, Geometry Concept

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INTRODUCTION

One of the abilities that professional educators must possess is being able to make students comfortable and at ease when carrying out learning both inside and outside the classroom. Professional teachers believe that they support, approve and carry out activities according to the stated educational goals (Skaalvik & Skaalvik, 2007). The high level of confidence of the teacher has been shown to have many positive impacts including in increasing student motivation and achievement in the classroom. Thus the teacher is expected to be able to work for more difficult challenges from time to time (Paneque & Barbeta, 2006). With the rapid changes that occur in the world of education, teachers are required to be able to adjust to ways that are more creative, flexible and practical, especially in learning (Arslan & Yavuz, 2012). Some findings stated that teachers must teach according to appropriate learning strategies (Scheerens, 2015; Van de Grift, W. J. C. M., Van der Wal, M., & Torenbeek,

2011), creating an orderly and safe learning environment (Panayiotou et al., 2014; Seidel & Shavelson, 2007), provide opportunities for students to learn more deeply, not discriminating students with each other (Kyriakides et al., 2002; Van de Grift, W. J. C. M., Van der Wal, M., & Torenbeek, 2011), convey high expectations to students if later successfully solve a problem (Stronge et al., 2011), and provide positive feedback to students (Harbour et al., 2015; Kyriakides et al., 2002). Not only teaches about learning and material in the classroom, educators also teach students about character building and skills to become the nation's successors who can be proud of in the future (Ekayani, 2017). Professional educators are those who have competent and mastered in the field and teaching materials and are able to choose learning methods well so that the learning process can run well (Falahudin, 2014; Marzuki & Khanifah, 2016).

Mathematics education is one of education which has an important role in daily life and geometry is a branch of mathematics. In all educational curricula call for mandatory geometry to be studied by all students at all levels of education (National Council of Teachers of Mathematics, 2000). Many studies show that many students have difficulty in learning geometry and show poor learning outcomes in mathematics classes. In learning at State of Elementary School (SDN) 02 Taman Kota Madiun, many teachers did not understand the role and use of approaches and models in learning activities. Many teachers were still guided by conventional learning which makes students bored and does not understand the learning material well. Moreover, in the material of cube and beam nets in grade 5, students will be difficult if they only refer to the textbooks and explanations from the teacher, but do not use media that can make students better understand the material being taught.

Those problems caused students did not understand the mathematics material that has been taught, especially in the material webs of blocks and cubes. Because teachers did not focus on the lessons taught and cannot really understand how the shapes and types of cube and beam webs. It has led to misunderstandings between teachers and students regarding learning material. The effect of the Realistic Mathematic Education (RME) approach on students can improve the learning process and understanding of mathematical geometry concepts in students with a pretty good value acquisition than before (Hayes et al., 2017). Mathematics learning using RME approach with the subject matter of cubes and blocks can improve understanding and understanding of students' geometric concepts (Muncarno & Astuti, 2018). Certainly not only using the RME approach can improve students' understanding of geometrical concepts, but also using media that can help students to better understand material about cube and beam webs. Didactic Design Media on material cube and beam webs can improve students' understanding of geometric concepts in developing students' critical thinking skills (Lestari et al., 2018). The use of three-dimensional media in learning to build cubes and beams can improve students' understanding of geometrical concepts (Hunt et al., 2011). The media used must

be made as interesting as possible and as clear as possible so that students can understand the message of the media.

Previous research, most of the use of media networks of cubes and blocks are still in concrete form so that teachers need to lift the media when moving class. Actually it has a good effect but it is not efficient in placement (Susilawati, 2019). Hikmah also applied concrete webs and concrete blocks to improve the ability to solve problems, but the problem referred to was only in problems that had formed mathematical equations (Hikmah, 2018). Another thing, in his research Zakiy developed learning media in the form of android on cube and beam webs. The results stated that the android media is suitable for use in learning but has not been further tested whether it can improve understanding of the concept of material (Zakiy et al., 2018).

Different from the present research that used the Realistic Mathematic Education (RME) approach in order to facilitate the learning of mathematics, of course, in determining networks of cubes and beams. RME itself is a learning method that teaches students material using real or real problems in their lives. students are given contextual problems, or problems related to realistic situations. RME learning is the use of reality and the environment that is understood to improve understanding of the concept of geometry to be better than before (Ningsih, 2014). In addition to using an approach, media in learning is also needed to more easily distribute material to students and students more easily understand it. The purposes of this study was to improve the understanding of elementary school students' geometry concepts through the RME model assisted by virtual nets.

METHODS

This research used Classroom Action Research which was focused on classroom situations, or Classroom Action Research (Scanlon, 2018). This class action research conducted in a participatory collaborative manner, namely research by collaborating collaboratively with teachers and researchers. The process of action taken in this study was strived so that the problems that occur can be resolved, as well as to improve the quality of learning.

The subjects of this study were fifth grade students of elementary schools. The object of this class action research was the application of the Realistic Mathematic Education (RME) approach to mathematics subjects to improve understanding of geometry concepts. This research was carried out with four stages, namely planning, implementation, observation, and reflection. In this study, the data collection methods used are; (1) observation method; (2) test method; and (3) documentation method.

The data obtained from research through data collection methods, then processed with descriptive analysis to illustrate the state of increasing achievement indicators of success in each cycle and to describe the success of learning mathematics subjects. The data in the form of numbers were processed quantitatively and presented in the form of numbers. The instrument used in this study was in accordance with the method of data collection, for the

researcher observation method using the observation sheet, and for the test method the researcher used the questions.

RESULT AND DISCUSSION

Pre Cycle Results

In this activity the researchers identified student learning outcomes data obtained from class teachers so that researchers know students' mathematical understanding before being given action. Learning outcomes data was known if not all students in the class meet the minimum passing score. There are still 50% of students who have not achieved that grade.

Cycle 1 results

Based on observations in the implementation of cycle 1, the activeness of the teacher has reached 93.75% which included in the active criteria and has reached the expected indicator of 80%, but the percentage of students who reach the minimum passing grade is 70% students and this fact cannot be said achieved the expected achievement indicator of 80%. After further investigation, the constraints of students in Cycle I were that students could associate mathematics learning with real life and thoughts but it was still a little difficult to understand the virtual web media properly. Although there were also many students who understand the media and the approach adopted by the teacher, there are still students who do not dare to ask the teacher even though they have been given the opportunity to ask questions by the teacher. This is certainly a problem of students in terms of learning so as to make students get learning outcomes that are not optimal. Based on these constraints, research must proceed to cycle 2 with an improvement plan where students will be rewarded if they are enthusiastic and active during the teaching and learning process.

Cycle 2 results

Based on observations in the implementation of cycle 2, the teacher's activeness has reached 100% which is included in the active criteria and has reached the expected indicator that is 80% and the percentage of students who reach the minimum passing grade is 100% so that it has reached the expected achievement indicator of 80%. Thus the constraints of students in cycle I have been successfully corrected well in cycle II and get very satisfying results. The study stopped because all the indicators of achievement have been met. In summary, the following is a comparison of results from pres cycle, cycle 1, and cycle 2.

Tabel 1. The Result of Pre Cycle, Cycle I and Cycle II

Aspect	Pre Cycle	Cycle I	Cycle II
Max value	85	90	100
Min Value	50	65	75
Average Value	67,5	78,5	92,6
Percentage of completeness	50%	70%	100%

The findings showed that the virtual nets media based on the Realistic Mathematic Education (RME) approach in the mathematics subject matter of cube and beam space nets can improve the understanding of elementary school students' geometric concepts. This is based on (1) an increasing in student learning outcomes, especially in the material cube nets and beams; (2) the number of students who have scores exceeding the minimum grade of mathematics passing standards was more than 80%; (3) teachers and students were more interested in the learning process because learning media were packaged in digital form.

The alignment of this research with some previous studies was to produce conclusions stating that if the application of Realistic Mathematic Education (RME) in the learning process can produce outputs that benefit teachers, students, and schools which will result in better education processes. In his research, Rahman concluded that in two cycles it turned out that Realistic Mathematic Education (RME) was able to make teachers and students collaborate actively in the class so that the learning conditions were more conducive. It was evidenced by the learning outcomes of students experiencing completeness with an average grade above the minimum grade passing grade (Rahman, 2017).

Other research stated that the effect of applying RME can improve students' mathematical reasoning abilities higher than other learning models (Rindi Antika, 2019). Different from the finding implied that RME is a model that emphasizes contextual problems in daily life so that indirectly RME is also able to improve students' ability to solve problems if applied correctly (Bonotto, 2008; Fatimah et al., 2020; Fauzan, 2002). Students are able to find their own answers to problems from real life, and students can develop and practice their knowledge by discussing the results of their answers with peers (Arrahim & Widayanti, 2018; Arsaythamby & Zubainur, 2014; Fauzan et al., 2002). Another positive impact of RME is that it can improve students' mathematical self-concepts in the millennial era. Mathematical self-concept of students is based on observations that state students become more enthusiastic in carrying out mathematical learning activities and active in learning activities (Sitorus & Masrayati, 2016; Sopyan et al., 2019).

CONCLUSIONS

This study concludes that through the virtual nets media based on the Realistic Mathematic Education (RME) in the mathematics subject matter the cube and beam space nets can improve the understanding of the geometrical concepts of fifth grade students of State of Elementary School (SDN) 02 Taman Kota Madiun. The implications of this research can be applied in the scientific and practical world. In the scientific world, this can be used as a reference in developing RME. For practical domain RME can be used as an effort to improve students' reasoning abilities. This research also shows that RME can be applied to have a better impact on the quality of learning in the classroom as well as the need for further development of this research. In the end, RME is very important to be applied in mathematics learning especially for elementary school students who are still in the stage of thinking concretely.

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Octarina Hidayatus Sholikhah (OHS) is lecturer at Department of Primary Education Universitas PGRI Madiun. OHS is the editor of *Premiere Educadum: Jurnal Pendidikan Dasar dan Pembelajaran*. OHS was the main author in this paper. Rasmita (R) was the second author who provided support in being a comparative researcher.

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