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IDENTIFICATION OF STUDENTS' WORK IN RESOLVING THE PROBLEM OF POLYHEDRON

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ABSTRACT

The research aims to identify students ' work in resolving the problem of polyhedron. This research used a qualitative descriptive method conducted at the state Junior High School in Batujajar. The instrument used in this research is a test of the problem that has been adjusted to the indicator of the polyhedron material of a) mention the elements of the cube, Cuboids, Prism, and Pyramid (ribs, field, side, diagonal field, diagonal space, field Diagonal); b) determines the surface area of the polyhedron c) The volume of polyhedron; d) solve the problem of polyhedron in daily life. Based on the research results of the 4 problems given are received percentage value in a row of 29.03%; 66.12%; 65.70%; 47.90% of the results showed that students are still struggling in determining the elements of polyhedron chamber and creating a mathematical model of the story related to everyday life.

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INTRODUCTION

Sidik et al., (2018) Mathematics is always developing never run out from time to time, as the development of mathematical sciences is increasingly diverse. But it can actually make an impact problem if it is not accompanied by readiness from the educator or students. Even though the importance of learning mathematics in schools will become their provisions for use in everyday life. Mathematics is a basic introduction to life, so mathematics is always studied at every level of education.

Mathematics education according to Lipianto in (Sumadiasa, 2014) has a very important role because mathematics is a basic science that is used widely in various areas of life. Through learning mathematics students are expected to cultivate a critical thinking ability, logical, careful, effective and efficient in solving problems. Learning Mathematics is a continuous process to acquire new concepts, ideas, and knowledge-based on previous experiences. Education is certainly not separated from the learning process. In the process, learning has a specific purpose. Mayer and Witrock (1996) on (Mulyono & Hapizah, 2018) argue that two important learning objectives are to form the ability of retention and transfer capabilities (which if both are accomplished it indicates the meaningful Learning). Retention is the ability to recall for a long period for the material to be studied. While the transfer is the ability to use what has been learned to solve new problems, answer new questions, or facilitate to learn new things.

The provision of mathematical materials is usually conveyed when the learning process, automatically students get the material when studying. Learning by (Astuti, 2015) is a process of intentional behavioral change based on experiences that are not merely attitudes and values but also mastery of knowledge and skills. The material is delivered in every teaching and learning activity, but not all students have the same ability in material acceptance. Acceptance of students ' learning materials differs from the difficulty of learning. For that repetition or practice is necessary so that students can understand the material well. As it is said (Syarifuddin, 2011) That something learned needs to be repeated to pervasive in the brain so that it is fully mastered and difficult to forget. Instead, learning without repeated results will be less satisfactory. Regardless of the door, one has to repeat his lesson or practice himself at home so that the ingredients are studied increasingly pervasive in the brain so that it is durable in memory. Repeating lessons is one way to help the functioning of memory. Also,

exercises can be known where the difficulties faced when answering questions to improve. Especially in math lessons where repetition or practice is something that should always be done.

James (Suherman et al., 2003) in the mathematical dictionary says that mathematics is a science of logic about the form, arrangement, magnitude, and concept of related other with a large number and divided into three major areas namely algebra, analysis, and geometry. The above statement demands to understand the three areas mentioned in which one of them is geometry.

According to (Yazidah, 2017) geometry is one of the field scopes in mathematics that has an important role in everyday life. Ruseffendi stated that geometry is an axiomatic system and a collection of generalizations, models, and evidence of the forms of field and space objects. Van de Walle (2001) suggests the importance of learning geometry including (1) geometry is capable of providing a more complete knowledge of the world; (2) Geometry exploration can develop problem-solving skills; (3) Geometry plays an important role in learning other concepts in mathematical learning; (4) Geometry is used every day by many people; (5) Geometry is a pleasant teaching.

In mathematics learning understand the concept of being a very important thing. According to (Made Suarsana, Widiasih, & Nengah Suparta, 2018) Mathematics conceptual understanding is the ability to understand concepts, oration and relation in mathematics. As we know math lessons are always struggling with counting count, the activity is not far from the mathematical formula itself. Harm most students only memorize the formula without understanding the concept of learning in the intent even still encountered students who do not memorize the elements of a space geometry, when the ability to know the elements or characteristics of a building geometry Is the initial stage of geometry thinking ability. As Van Hiele mentioned (Rizqiyani, Fatimah, & Mulyana, 2017) geometry-thinking skills are sorted into 5 levels of geometry thinking. The fifth level is level 0 (Visualization/introduction) is the level in which students can only know geometric forms based on their visual characteristics and overall appearance but explicitly not focused on the properties of the object being observed; Level 1 (analysis) is the level in which students can determine the concepts and properties of the observed object; Level 2 (informal ordering/deduction) is the level in which students can understand the abstract definition and can explain the relationships of traits in a

building geometry and the properties between several geometric builds so that students can classify the wake-up geometry according to the similarity of definition and properties; Level 3 (deduction) is the level by which students can conclude things that are common to specific things, and have begun to understand the evidence and use axioms or postcaterers in proving a concept of geometry; Level 4 (accuracy/rigor) which is the level by which students can explain the formal reason in the mathematical system, can analyze the axiom and definitions, and can explain the linkages between the undefined form, axiom, definitions, theorem.

(Malasari, Herman, & Jupri, 2017) Geometry is one of the oldest and the most fundamental branches of mathematics. Geometry much involved in various real live situations, one example is polyhedron subject. Polyhedron subject is referred to in this study are cubes and cuboids. According to (Wijayanti, Kusumah, & Suhendra, 2017) Polyhedron is one of the compulsory materials for every level of education in Indonesia, but many students are still have difficulty to solve the problem in this topic. Polyhedron topic in secondary level includes the activity to know the elements of cube, cuboid/ rectangular prism, prism, and pyramid, make the net of polyhedron and solve problem-solving problems related to surface area and volume base on latest curriculum.

Based on this research aims to know the ability of students to work on polyhedron so that it can be known what is the difficulty of students when solving the problem given.

METHOD

This research is a qualitative descriptive study. This type of research was chosen because according to (Darmawati, Irawan, & Chandra, 2016) qualitative descriptive of research that aims to reveal a situation, facts, phenomena, variables that are occurring at the time of research underway and Present in the form of sentences or words. This study was held on Wednesday 20 November 2019 at SMPN 1 Batujajar West Bandung. The subject of this study was conducted against 31 student IX grade. The chosen grade XI as the subject of research due to the material we have been studying in grade VIII so that we can know the extent to which students can work on the questions given. The Data collected is a test. The question of the test used is a question of the national exam SMP/MTs that corresponds to the indicator found in the syllabus with the basic competencies of learning to polyhedron for junior high school students and there are 4 problems tested. The test problem was then consulted to members to have the validity of the contents.

The assessment used for the percentage according to Purwanto (2009:102) in (Huda & Kencana, 2013) is as follows:

$$NP = \frac{R}{SM} \times 100\%$$

Description:
NP = percentage value searched
R = Score obtained
SM = maximum score

RESULT AND DISCUSSION

The research was conducted by performing a test about building a room to grade IX students at SMPN 1 Batujajar, which amounted to 31 people. The problem is given as many as 4 problems with varying levels of difficulty. Making problems in adjusting with the indicators found in the JUNIOR mathematics syllabus. Such indicators include: a) mentioning elements of cubes, beams, prisms, and limas (ribs, field, side, diagonal fields, diagonal space, diagonal field); b) determines the surface area of the polyhedron c) The volume of the polyhedron; d) solve the problem of polyhedron in daily life.

Based on research conducted that students can answer the question of a good count, but there is a problem that no one student gets a value that meets the ideal maximum score (SMI), that is question number 1. The average result that can be from each question in succession is 5.80; 26.45; 12.74; and 9.58. On the average, if we change into percentages, it can be a percentage of questions consecutively 29.03%; 66.12%; 65.70%; 47.90% as in the following diagram:

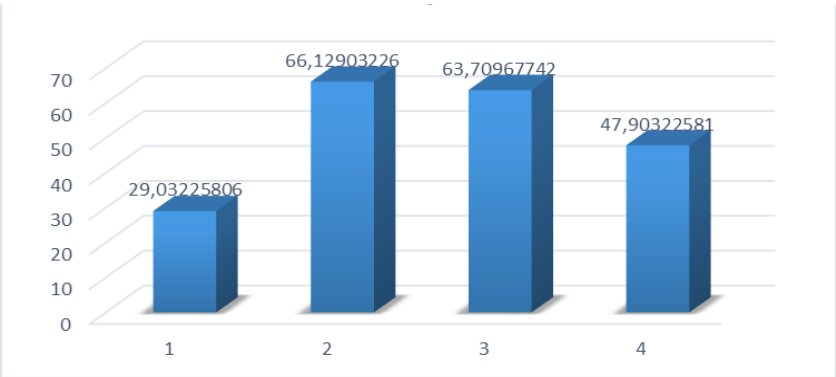
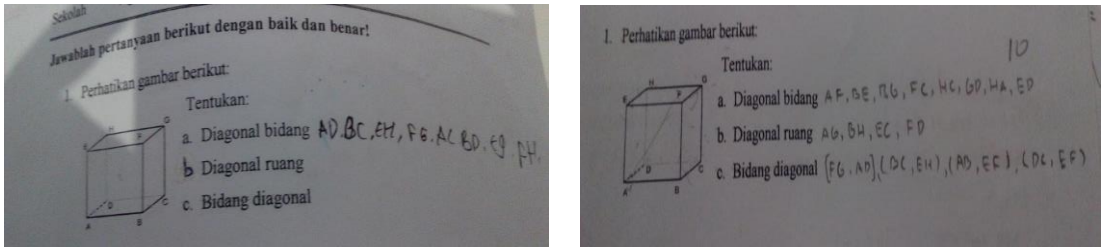


Figure 1. Results of The Average Percentage of Polyhedron Instrument

The diagram above shows that the question number 1 has the lowest result with a percentage of 29.03%, problem number 2 has a percentage of 66, 12%, problem number 3 has

a percentage of 63.70%, and problem number 4 has a percentage 47, 90%. From the explanation above, two problems do not reach 50%, which is about number 1 and number 4, the second indicator of the problem in succession, namely the elements of the cube, cuboids, Prism, and Pyramid (rib, field, side, diagonal field, diagonal space, field Diagonal); and solve the problems of building flat side spaces in everyday life. In question number 1 There are still many students who do not know the diagonal field, diagonal space, and diagonal field, as seen from the work of students below:



(a) (b)

Figure. 2 Student Work for Question No. 1

The student's work in Figure 1 (a) indicates that students are not able to answer points a (diagonal space) and point b (diagonal field).In Figure 1 (b) Students are only able to answer two of the correct questions that point A and point B and one problem that is still the erroneous answer is about point C. The biggest value students get to Question No. 1 of 31 students no one gets the value according to the SMI problem of 15, most students are only able to work on one or two points of the three asked. It shows that students are still weak in identifying questions about the elements of polyhedron namely diagonal field, diagonal space, and diagonal field.

The following are the students ' answers to questions No. 2, 3 and 4. The answer to the three questions is a count according to the formula they learned earlier.

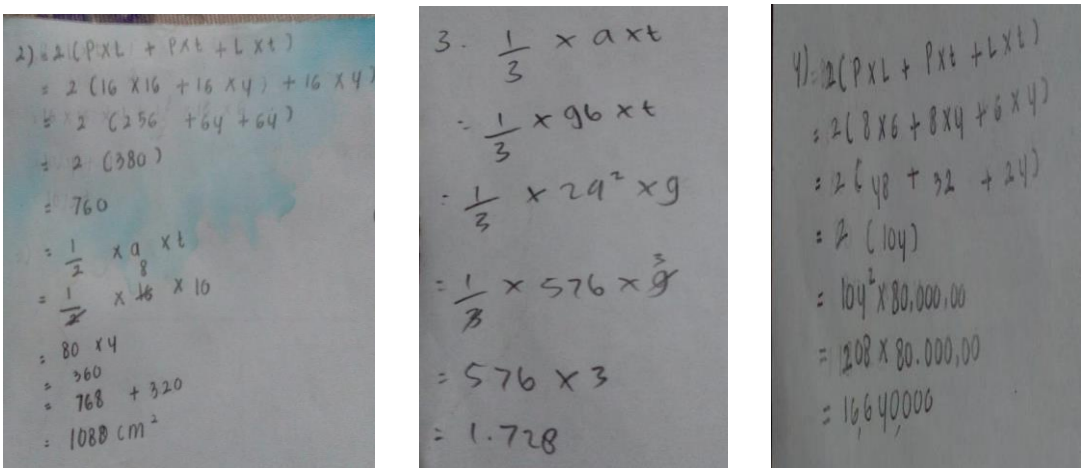


Figure 3. Student Work for Question No. 2, 3 and 4

Figure 3 shows the results of the students to question numbers 2, 3, and 4 can be done well. Problem number two is a question about the surface area of a wake-up space, from the answer given by the student, visible students can answer the question according to the steps and the formula of building the space contained in the problem. In question number 3 students are required to find the volume of a room up according to the indicator and the student can answer the question well. For question number 4 is the question associated with daily life, in this question students can answer but most students do not work the problem until it is completed but still some students have not been able to translate the problem Mathematics so problem number 4 only gets a percentage of 47.90%.The lack of ability of the students to change their story into the mathematical model in line with the research (Huda & Kencana, 2013) stating that based on the test results and interviews obtained 12.5% students tend not to change the problem form words into symbols because the students tend to be difficult to understand the concepts that exist in the matter of cube material and beams.

Based on these results, it appears that students have difficulty in understanding the concept of elements of building flat side spaces so that students cannot show part of the building space such as diagonal fields, diagonal space, and diagonal fields. The results mean that understanding the mathematical concept is still fairly low for the basic concept of building a flat side space. These results are the impact of learning students at the time of learning mathematics, hence the need for innovative learning. According to (Dinia & Minarti, 2019) in the case of addressing the problem of learning how students can learn math should be given extra motivation to be more active in completing work or mathematical tasks, also teachers must be able to bring Nice atmosphere in the implementation of mathematics learning and

strive to always apply the Learning Society (Group Learning) in the implementation of mathematics learning so that it can facilitate students ' understanding of mathematics And can train students to get along positively with all circles.

CONCLUSION

Based on the results of the research conducted, to identify the difficulties of students in working with the math problem can be concluded that according to the student work in question number 1 and 4, students still have difficulties in working on the problem About the elements of polyhedron namely diagonal fields, diagonal space and diagonal field and turn the story into a mathematical model. Results show that students still do not know what the diagonal is and what the shape of the diagonal is and many students are still mistaken in converting math problems into mathematical models. It is seen from the percentage result for question number 1 and 4 respectively is 29.03% and 47.90%. Therefore, to overcome the difficulties of these students should be held innovative learning both with variations of approaches and methods of learning or using learning media such as using props or media learning. That uses technology following the age development of technology becomes commonplace in various areas including education.

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