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Learning design of planes using context culture traditional house Bengkulah

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Learning design of planes using context culture traditional house Bengkulah

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Abstract. In this case, the research that will be carried out aims to find out the cultural context of the bengkulah traditional house. The research subjects are students of SMP Negeri 1 Tanjung Lubuk. The method used in this research is the validation study design research method, alleged learning (Hypothetical Learning Trajectory). Through an interactive process including designing (Preliminary Design), (Teaching Experiment) and (Retrospective Analysis). Data collection is done through several things including making video recordings of class events and group work, collecting student work, giving preliminary and final tests, and interviewing students. So that it can show the process of implementing learning, that the use of the cultural context of the custom house can support students understanding material Rectangles and triangles.

1. Introduction

Plane is one branch of mathematics taught in the school bench, from elementary school through high school, but when students are given plane material, there are still difficulties in finding examples and working on problems that are difficult to distinguish between square and rectangular [1 - 5]. Planes basically has a greater chance of being understood by students compared to other branches of mathematics [6]. However, the facts that occur in the field, at the core stage of learning students are less invited to communicate to give examples that they know are caused by the habit of describing forms about flat shape, one of the solutions offered is to initiate learning with contextual problems so students learning from informal concepts to more abstract concepts by giving questions so as to make learning to wake up flat meaningfully for students [7, 8].

The curriculum is one of the elements that can make a significant contribution to realizing the process of developing the potential quality and catchment of students [9]. Therefore it is necessary to change with improvements in the learning process and must make students active so that they can achieve the competencies that have been set. One effort to improve the learning process and achievement by using contextual questions in the learning process is in line with the Indonesian Realistic Mathematics Education approach (PMRI). In many classes, especially in mathematics on rectangular and triangular material, the teacher is required so that students are able to solve problems that have questions that the teacher gives. In mathematics education, it is not enough for teachers to only teach how to solve problems, to ensure that students are able to create ideas that are effective and efficient for solving mathematical problems. One way to make students become active in learning is to choose the right context in accordance with the material being studied so that students are able [10].

Learning mathematics using context is closely related to the use of Indonesian Realistic Mathematics Approach (PMRI) [11]. The researcher will use a context that is in accordance with the material of a plane structure which is not far from the mind and environment of the students, that is, the culture of the traditional house, bengkulah. Culture is a nation's wealth that is priceless and is a heritage that deserves to be preserved [12, 13]. One way to preserve culture so that it is not forgotten is to embed cultural values early on in individuals of the nation's next generation. Because culture is the work of humans, the process of planting cultural values can be done through the family, community, education and can find mathematical concepts in a culture [14, 15]. The bengkulah traditional house is a legacy of the prince and the passion of the bengkulah clan, centred in Negeri Ratu village, which is now called Pulau Gemantung Village. The building in the form of a house on stilts with an area of 120 m^2 looks very majestic. Where in the traditional home of the bengkulah there are many elements of mathematics that are found inside the house or outside the home, so that it can be used in learning mathematics.

Research that uses traditional houses including [16] In the first research using the Toraja or Tongkonan traditional house, students were invited to recognize right angles, paint circles and get to know the plane shapes of triangles and rectangles. The second research produced a learning trajectory that can help students understand the concept of the area of a rectangular plane shape using the tangram context with the method of research design type validation study [17]. Third Research Helps know students' mathematical creative thinking knowledge in the introduction of plane shapes with the type of research design validation study method [18]. This study uses the cultural context of a traditional house with a three-footed triangle shaped as an object that is the traditional house.

Based on the background stated above, the purpose of this study is to find out the cultural context of the bengkulah traditional house to help the process of understanding rectangular and triangular material and to produce a learning trajectory using the cultural context of the traditional house bengkulah for students.

2. Method
This research uses a validation study design research method that aims to prove learning theories and develop Local Instructional Theory (LIT) with the collaboration of researchers and teachers to improve the quality of learning [19 - 21] defining three stages in design research, namely: (a) preparing for the experiment, (b) the design experiment and (c) retrospective analysis. The results of the first cycle are used to revise the initial HLT version for one class participating in the second cycle (teaching experiment). In the second cycle, 32 students from grade VII.1 of SMPN 1 Tanjung Lubuk was conducted on November 25, 2019 to participate in this learning. Students are taught by their own teachers as model teachers (instructors) and researchers act as observers of learning activities. The third stage of retrospective analysis, the data obtained from the teaching experiment stage were analysed to develop designs in the next learning activities. HLT that has been designed is then compared with the actual student learning trajectory during the implementation of learning. Data analysis was followed by researchers and mentors to increase the validity and reliability. Validity is done to see the quality of a set of data that has an effect on drawing conclusions from this study. The validity of an instrument matters whether the instrument actually measures what it is trying to measure [21]. While Reliability is illustrated through a clear description of how data is collected so conclusions can be drawn.

3. Result and Discussion

3.1. Preparing for The Experiment and The Design Experiment
This learning is designed to produce a learning trajectory in learning rectangular and triangular material using the cultural context of the house bengkulah done at SMPN 1 Tanjung Lubuk. In this study, researchers conducted interviews with students who were the subjects of the study to determine the students' initial abilities. The results of the interviews show that students have learned the material Bangun Datar in elementary school, but for the material to understand the

relationship between traveling and the area they have not learned it. In addition, researchers provide a pre-test (pretest) to determine students' initial abilities. The first activity was designed to recall the forms of building in the Adata house and observe the cultural image of Bengkulah Traditional House. During group work, students begin to discuss and ask questions with friends. Researchers as observers look at the work of each group and give direction to the questions they give.

The first activity in cycle 1 is that students are asked to pay attention to the custom house. From these activities it is expected that students can observe the correct image of any plane shape contained in the traditional house. The picture below is a traditional house bengkulah.

Figure 1. Observing any type of wake.

Based on interview, students can already observe the condition of knowledge about the traditional house, bengkulah. Students already understand that there is a traditional house with plane figures. Next the teacher explores the students' knowledge about the forms of the type of plane figure and is named for each type they draw. Some students were initially confused when the teacher asked whether or not there was a picture of a parallelogram. But when they saw the traditional house drawn again they understood. In these activities appear and answer strategies students both group 1 and group 2. The student strategy in working on the problems in activity 1.
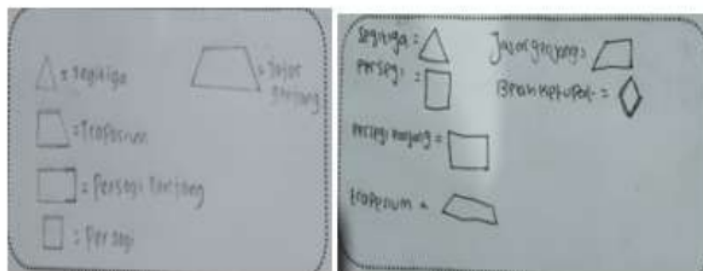

Figure 2. Some student answer strategies

Figure 2 shows the type of plane figures. In the next activity, each group is asked to understand and explain what is meant in the question. Both groups understood the purpose of the questions on LKPD and students were given the conditions of the house designed. Some students still don't understand to connect the material around and the area of the rectangle and the teacher helps students solve the problem problems that u have. The next question, students are given the

condition of comparing whether the same circumference and square area. Here the researcher wants each of the students to be able to solve the existing problems. This is made so that each student in the group, not only 1-2 people who understand the activities carried out but all members in the group understand the activities they discussed. The picture below is when students do work on the problems. In this case students can work on existing questions when students ask the purpose of the problem.

Figure 3. understand questions on activity 2.

Based on interview on one of the individual activities done by students 3 of group 2. Students have little understanding when asked after you have calculated the circumference and breadth of how do you find that they are the same. Students explain that the length and width are the same value. The mistakes they made while moving the formula were still confused. The teacher explains a little explanation of the questions, after the teacher explains some groups understand. Figure 4 shows answer strategy written by students.
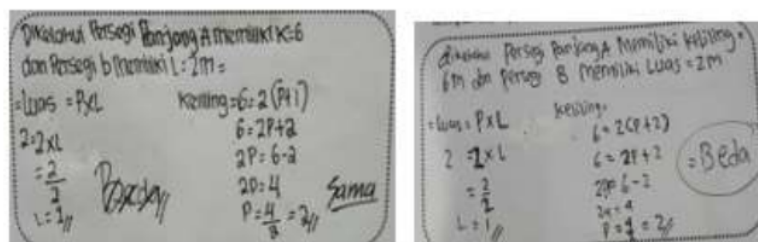

Figure 4. Some student answer strategies.

From the picture above it can be seen that each group has a different answer and already understands the rectangular material but only determines the same or not is still confused, in terms of the same answer. From the problem in get rectangle A has a circumference of 6 m and its width is 1 m. while square B has an area of 2 m and length 2 m. Is it the same size? Explain mathematically the relationship between the kelliling and the area of the rectangle.

For the next activity, discuss the triangle material, the way of working is the same in Activity 2, but by determining a different circumference and area, here we are looking for the same value and the same height. The last activity is to draw conclusions from activities 2 and 3 by comparing whether they are the same circumference and breadth.

3.2. Retrospektif Analysis

The following table 1 is a comparison between HLT that was designed with the results of pilot experiments on activities 1, 2 and 3

Table 1. Comparison between HLTs designed with the results of a Pilot Experiment

HLT	Pilot Results of Activity Expansion 1
Observe and find a picture of what is in the traditional house	Students can observe the culture picture of the traditional house given then draw and write.

HLT	Results of Pilot Activities 2 and 3
Observe and understand the purpose of the question.	Students can show and connect the material around the area of the rectangle and the triangle having the same size as the circumference and area
Understand the problem.	Students can find the perimeter and area of rectangles and triangles
Comparing the perimeter and area.	Students can compare the perimeter and area of rectangles and triangles and this activity is expected that all children in each group are active in discussion activities
Presentation of group results	Students present the work of each group. If there are different answers, the teacher asks other groups to present the results of the discussion
Conclusion	Students can conclude from the LKPD activities that the culture of the traditional house of bengkulah can find the existing structure and find the concept of the perimeter and area of rectangles and triangles.

The results of the research on pilot experiments obtained showed that the Actual Learning Trajectory, which is the process of learning in accordance with the HLT that has been designed. The use of custom house contexts can help students understand, interpret mathematical and mathematical relationships in daily life and help students compare and connect around and the extent. This is in accordance with obtained [22] which states that the use of real world contexts can be used as a starting point for the development of mathematical ideas and concepts in the RME approach.

4. Conclusion

Based on Based on the results and discussion that has been described the use of the cultural context of the traditional house of bengkulah can help students in understanding the forms of flat shape. Furthermore, students connect between the perimeter and area of rectangles and triangles by using the cultural context of the traditional house. Students are able to compare between perimeter and area. By using contextual problems that are very close to students' lives, namely the culture of traditional houses, make students more familiar with the problems given. In addition, students are more motivated and interested in solving given problems.

5. Acknowledgments

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