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Cultural-Based Contextual Learning Design Material Area and Circumference of the Square Through Tools Ancak

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Abstract. The 2013 curriculum in Indonesia emphasizes the application of scientific method-based mathematics learning, namely scientific learning. However, the fact is that learning mathematics, especially with plane-shaped materials, often uses conventional methods, monotonous presentation of concepts, and teacher-focused learning approaches. Therefore, learning mathematics should be linked to the realities of everyday life, one of which is through learning that utilizes the cultural context. Culture-based contextual learning is mathematics learning that uses a contextual approach with a cultural context as a starting point to build and connect students' understanding of contextual mathematics to formal mathematics. In this study, the cultural context used is a traditional tool in the form of a random number, which is usually seen by students in everyday life. Tools ancak is a traditional tool commonly used by the people of Sapit village as a place to bring various types of dishes to sacred events. The purpose of this research is to produce a culture-based contextual learning design on the area and perimeter of a square. This research method uses qualitative research with a design research approach to development studies. The results show that tools ancak is one of the traditional tools that can be applied to implement culture-based contextual learning because tools ancak has a physical form that can help students understand mathematics, especially the area and perimeter of a square. In addition, this culture-based contextual learning design is also beneficial for students to learn mathematics, especially the area and perimeter of a square while preserving local culture.

Keywords: Tools ancak, Learning Design, Culture

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Abstrak. *Kurikulum 2013 di Indonesia menekankan pada penerapan pembelajaran matematika berbasis metode saintifik, yaitu pembelajaran saintifik. Namun faktanya pembelajaran matematika khususnya dengan materi bangun datar seringkali menggunakan metode konvensional, penyajian konsep yang monoton, dan pendekatan pembelajaran yang berfokus pada guru. Oleh karena itu, pembelajaran matematika harus dikaitkan dengan realitas kehidupan sehari-hari, salah satunya melalui pembelajaran yang memanfaatkan konteks budaya. Pembelajaran kontekstual berbasis budaya adalah pembelajaran matematika yang menggunakan pendekatan kontekstual dengan konteks budaya sebagai titik tolak untuk membangun dan menghubungkan pemahaman siswa tentang matematika kontekstual dengan matematika formal. Dalam penelitian ini konteks budaya yang digunakan adalah alat tradisional berupa bilangan acak, yang biasa dilihat siswa dalam kehidupan sehari-hari. Alat ancak merupakan alat tradisional yang biasa digunakan oleh masyarakat desa Sapit sebagai tempat untuk membawa berbagai jenis masakan ke acara-acara sakral. Penelitian ini bertujuan untuk menghasilkan desain pembelajaran kontekstual berbasis budaya pada luas dan keliling persegi. Metode penelitian ini menggunakan penelitian kualitatif dengan desain pendekatan penelitian studi pengembangan. Hasil penelitian menunjukkan bahwa alat ancak merupakan salah satu alat tradisional yang dapat diterapkan untuk melaksanakan pembelajaran kontekstual berbasis budaya karena alat ancak memiliki bentuk fisik yang dapat membantu siswa dalam memahami matematika khususnya luas dan keliling persegi. Selain itu, desain pembelajaran kontekstual berbasis budaya ini juga bermanfaat bagi siswa untuk belajar matematika khususnya luas dan keliling persegi dengan tetap melestarikan budaya lokal.*

Kata kunci: Alat ancak, Desain Pembelajaran, Budaya

INTRODUCTION

Mathematics is a science that has a major contribution to modern technologithat are widely used in human life (Hasliyati et al., 2021; Supiarmo et al., 2020) . For students, mathematics learning is also a part of education that plays a role in developing thinking processes in dealing with mathematical task (Dewi Murniati et al., 2013; Supiarmo et al., 2020) . The 2013 curriculum emphasizes the application of scientific method-based mathematics learning, namely learning by observing scientific mathematical task to stimulate student activity in learning (Richardo, 2017) . However, in reality, learning mathematics, especially plane-shaped materials, often uses conventional methods, monotonous presentation of concepts, and teacher-focused learning approaches (Irawan & Kencanawaty, 2017; Misdalina et al., 2013) .

Learning mathematics should be associated with the reality of everyday life because mathematics has become entrenched in the lives of students in society (I Gusti Putu Suharta, 2017) . In addition, learning in which social and cultural interactions occur is a reflection of good mathematics learning (Sudirman et al., 2017) . As for learning using a cultural context, it is ethnomathematics (Hasliyati et al., 2021; Tlonaen & Deda, 2021) .

Ethnomathematics is defined as a mathematical activity carried out by certain cultural groups in society (Hariastuti, 2014; Hasliyati et al., 2021) . Advances in science provide solid for the application of ethnomathematics in schools to overcome complex task in the practice of learning mathematics so that its application is starting to develop rapidly in education, especially in Indonesia (Hasliyati et al., 2021; Widada et al., 2019) . The development of ethnomathematics through culture makes people not aware of ethnomathematics because it is considered simple when compared to formal mathematics in schools (Hasliyati et al., 2021) .

Based on the literature review, it is known that a lot of research on ethnomathematics has been carried out to develop culture-based learning to increase students' interest in learning mathematics. Research by Elly Susanti, et al. (2020) , related to the design of culture-based learning using traditional games.

The research by Sudirman et al. (2017) explained that ethnomathematics on Indramayu batik motifs such as points, lines, and planes in the form of ellipses and circles can be a reference for learning mathematics on the topic of transformation geometry. Research by Ulum et al. (2018) on the Pasedahan Suropati batik motif, which can be a source for applying geometry learning. The research of Hasliyati et al. (2021) explored the Uma lengge traditional building, which could be used to teach the concepts of plane and solidd structures to students. This proves that mathematics learning is not always sourced from reading books but can also be done through local culture. Therefore, one solution to the learning task experienced by students is cultural-based contextual learning.

Culture-based contextual learning is mathematics learning that uses a contextual approach with a cultural context as a starting point to build and connect students' understanding of contextual mathematics to formal mathematics (Kusuma, 2019; Kleden et al., 2017) . This learning model can be an alternative for teachers to innovate learning so that students become active and creative in learning (Samo et al., 2018; Ihsan, 2015; Ramdani, 2018) . Culture-based contextual learning can directly build students' knowledge of mathematics and culture (Kusuma, 2019; Kleden et al., 2017) . In addition, this learning is very important to fostering students' love for the surrounding cultures. This love provides positive affective competence as a form of student nationalism towards the state (Jayanti & Puspasari, 2020; Palinussa, 2013; Richardo, 2017) .

In this study, cultural-based contextual learning was carried out on the area and perimeter of a square. The cultural context used is a traditional tool in the form of a random number, which is usually seen by students in everyday life. Tools ancak is a traditional tool commonly used by the people of Sapit village as a place to bring various types of dishes to sacred events. Examples include traditional maulid events, paying votive, ngurisang, nyunatang, membangar, salamet gumi, and other events.

Tools ancak is made of woven bamboo and is made into a square, where there are small square holes on the long and wide sides with varying amounts. The number of holes in the tools ancak is adjusted to the size of the tools ancak. So the

larger the tools ancak size, the more square holes there are. Traditional tools can be one of the media that can be applied to implement culture-based contextual learning, especially in the area and perimeter of a square.

Based on the description above, this research will present a cultural-based contextual learning design to understand the area and perimeter of a square through the traditional tools ancak tool. This is also supported by the absence of research that discusses learning design in a cultural context using tools ancak material on the area and perimeter of a square. This research design is expected to be a source of reference regarding how to implement culture-based contextual learning that can trigger student activity in learning mathematics.

RESEARCH METHODS

This research is a qualitative research approach with a design research type of development studies. The design of mathematics learning through cultural local wisdom is carried out through mathematical exploration, which is in the local cultural wisdom of the local community. However, the cultural context, in this case the tools ancak making process, is not only limited to exploration but also creates learning designs. The method used is to make tools ancak traditional tools as a source of knowledge as well as to implement mathematical material related to the area and perimeter of a square in grade V Elementary School. This research was carried out in several stages, including the first step, where the researcher chose mathematical material, namely the area and perimeter of a square, which was integrated with the tools ancak making process. In the second step, the researcher searches for and identifies the tools ancak generation process that includes the concepts of area and perimeter of a square. In the third step, the researcher explores the concept of the area and perimeter of a square in the tools ancak making process used in learning. In the fourth step, the researcher determines the integration model of random traditional materials and tools. In the fifth step, the researcher determines the learning model and method used, namely the contextual learning method. As for the last step, the researcher describes the design of learning mathematics integration with the area and perimeter of a square through a random creation process.

RESULTS AND DISCUSSION

Material Area and Circumference of the Square

The area and perimeter of a square Two-dimensional plane shapes are also known as squares and are often called quadrilaterals. The square is a plane shape that has four sides of the same length and four right angles (Wardani & Setyadi, 2020) . A square has properties that, among others, all sides are the same length, all sides of a square are parallel to each other, a square has angles where each angle is a right angle, a square has two diagonals that are the same length, and a square has an angle that has each of these angles. will be divided equally by its diagonal (Fitryanti et al., 2016) . The formula for the area and perimeter of a square will be described as follows.

- Square area formula

  Area of square = *side* × *side*

  = *s* × *s*

  = *s2* –

  Example: Find the area of a square that has a side length of 10 cm!

  Solutions:

  Given: s = 10 cm, and asked L = ...?

  Answer: L = s × s = 10 cm × 10 cm = 100 cm ^{2}

  So, the area of the block is 100 cm ^{2}

- Perimeter of a square formula

  Perimeter of Square = *side* + *side* + *side* + *side*

  = *s* + *s* + *s* + *s*

  = 4 × *s*

  Example: Find the perimeter of a square living room that has a side length of 15 meters!

  Solutions:

  Given: s = 15 m, and asked K = ...?

  Answer: K = 4 × s = 4 × 15 m = 60 m

  So, the perimeter of the living room is 60 m.

Integration method

Mathematics learning through cultural local wisdom is carried out through mathematical exploration, which is in the local cultural wisdom of the local community (Mutijah, 2019; Rosikhoh & Abdussakir, 2020) . The local cultural wisdom in this study uses traditional tools ancak tools. In this study, not only is exploration carried out, but also learning designs are created. The method used is to make tools ancak traditional tools as a source of knowledge as well as a means to implement the area and perimeter of a square. The culture-based learning design in this study was focused on learning the area and perimeter of the fifth grade of elementary school.

The implementation of cultural-based contextual learning is carried out on the area and perimeter of a square. The context used in this study is in the form of traditional tools that are usually seen by students in everyday life. These traditional objects are random.

Figure 1. Tools Ancak

Tools ancak is a traditional tool commonly used by the people of Sapit village as a place to bring various types of dishes to sacred events. Examples include traditional maulid events, paying nazar, ngurisang, nyunatang, membangar, salamet gumi, and so on. Tools ancak is made of woven bamboo and is shaped into a square, where there are holes in the shape of a small square on the long and wide sides with varying amounts. The number of holes in the tools ancak is adjusted to the size of the tools ancak, the larger the size, the more square holes in tools ancak.

Contextual Learning Based on Extensive Material Culture and Square Circumference Through Tools ancak

Learning mathematics should be linked to the reality of life because mathematics has become part of the culture of students' lives in society (Samo, 2019) . In addition, Bernales & Powell (2018) state that learning in which social

and cultural interactions occur is a reflection of good mathematics learning. The culture-based contextual learning design in this study was carried out on the area and perimeter of a square. The cultural context used is through the random making process.

Learning mathematics through random traditional tools is carried out through mathematical exploration, which is in the local wisdom of the local culture. Therefore, contextual learning methods can be used. Bernales & Powell (2018) and Kleden, et al. (2017) stated that culture-based contextual learning is mathematics learning that uses a contextual approach with a cultural context as a starting point to build and connect students' understanding of contextual mathematics to formal mathematics. This learning model can be an alternative for teachers to innovate learning so that students become active and creative in learning (Juniarti et al., 2022; Tandiseru, 2015) . The design of cultural-based contextual learning designs on the area and perimeter of a square is described as follows.

Contextual learning based on the material culture of area and the perimeter of a square begins with the teacher greeting and inviting students to pray together at the start of the lesson. Then the teacher demonstrates perception by reminding students about the prerequisite material to understand the area and perimeter of a square. Before arriving at the core activity, students were first divided into small groups consisting of 4-5 students. This is done to stimulate students to actively work together during the learning process.

In the preliminary stage, the teacher recalls students' knowledge of objects that make up the concept of area and perimeter of a square around them. This is done through question-and-answer activities. After listening to the students' answers, the teacher then explains that one of the traditional tools that can make it easier for students to understand the area and perimeter of a square is tools ancak. The teacher explained that tools ancak has a very varied size, including 30×30 cm, 50×50 cm, and 60×60 cm according to needs.

In the next step, the teacher gives 25 pieces of bamboo slices to each group. Then students are asked to make a random string with many square holes, with

each square representing a length of 1 cm. Groups one and two were asked to make tools ancak with nine square holes as shown in figure 2. Meanwhile, groups three and four were asked to make an tools ancak with twelve square holes, as shown in picture 3. Each group of students is chosen at tools ancak according to the teacher's direction.

After making the tools ancak, the teacher asks the students to count the number of squares and add up the entire length of the square holes formed, so that the length and width of the tools ancak are known. Of course, students will get different random lengths and widths. In a random nine square hole, students will find a length of 3 cm and a width of 3 cm because each square represents 1 cm. As for the tools ancak with twelve square holes, students will get a length of 4 cm and a width of 4 cm. Then the teacher asked the students to calculate the area and perimeter of the random. At this stage, the teacher gives enough time for students to have discussions with their group friends. This is intended so that learning occurs that can trigger students to be active and creative in solving the task given.

The teacher gives the students a certain amount of time to solve the problem with their group of friends. The cultural contextual task presented attract the students' attention to actively working together. Because tools ancak is a traditional object that students usually see and use in social life. Then the teacher asks student representatives from the two groups to demonstrate the work of each group. The teacher allows students to make presentations related to the problem solving process they found. After each group representative finished demonstrating the results of their work, the other groups were asked to respond. This is done through question and answer activities to present student-centered learning while the teacher only acts as a facilitator.

The teacher gives worksheets, which can be seen in Figure 4, where there is a random item that has a length of 70 cm and a width of 70 cm. Students are asked to calculate the area and perimeter of a square if every 10 cm is represented by a square. At this stage, students are asked to conduct discussions and ask questions of their group friends. The teacher gives time and complete freedom to students to convey ideas related to mathematical concepts used to solve mathematical task.

Representatives of students from each group were asked to demonstrate and explain their work. Sometimes students ask questions about their work, and the teacher only acts as a guide and provides reinforcement when needed.

Next, the teacher gives an assignment to measure the level of students' understanding by giving story questions related to the area and perimeter of a square. Then the teacher asked the students to solve the problem individually. After being given a time limit, representatives from the class were asked to present their work. Other students pay attention and ask questions if their friends' answers are not clear. The teacher provides explanations and reinforcement, as well as prepares the final activities of learning.

At the end of the learning activity, the teacher concluded that, related to student work, the area of a square can be obtained by performing multiplication operations on the length and width of a random or s × s. The perimeter of a square can be found by adding up the four sides of a tools ancak cube, namely two long sides and two wide sides. Before the lesson ended, students were given practice questions to one of their skills regarding the area and perimeter of a square. The teacher then closed the lesson with a greeting. The culture-based contextual learning design to understand the area and perimeter of a square is described as follows.

Basic competencies
1. Explain and determine the perimeter and area of a square.
2. Solve task related to the perimeter and area of a square.
Indicators of Competency Achievement
1. Examine the methods for calculating and determining the perimeter of a square.
2. Examine the methods for calculating and determining the area of a square.
3. Solve task involving the perimeter and area of a square.
4. Presenting solutions to task involving a square's perimeter and area.
Learning Objectives
Through group work using a culture-based contextual learning model, students can understand how to determine the perimeter and area of a square.
Learning steps
Introduction : (Stimulates and prepares students to learn the area and perimeter of

a square through the random generation process).

1. The teacher opens the lesson by introducing herself and asking the students how they are.
2. The teacher invites students to pray and asks the class leader to lead the prayer.
3. The teacher does apperception by reminding students about the prerequisite material. Next, recall students' knowledge of traditional square-shaped objects that are commonly seen and used at home, namely tools ancak. In addition, the teacher prepares bamboo slices that will be used to implement culture-based contextual learning.
4. Students listen to the teacher's explanation regarding the activities to be carried out and the objectives to be achieved through learning.
5. Students are divided into small groups consisting of 4-5 people.

First stage core activities : (Students can understand the area and perimeter of a square through contextual math task)

1. Each group is given 25 bamboo slices.
2. Students are asked to make a random quilt with many square-shaped holes. Each square represents 1 cm in length.
   Groups one and two were asked to make a random with nine square holes.

Figure 2. Nine Holes Tools ancak

Groups three and four were asked to make a random with twelve square holes.

Figure 3. Twelve Holes Tools Ancak

3. Students and their groups of friends make tools ancak choices under the direction of the teacher.
4. After the tools ancak is made, the teacher asks the students to count the number of squares and add up the entire length of the square holes formed so that the length and width of the tools ancak are known.
5. Students must compute the area and perimeter.

6. Student representatives from each group were asked to demonstrate and explain their work.
7. Students inquire about their work.
8. Each group is given the freedom to convey the results of their discussion, and the teacher, as a facilitator, plays a directive role if at any time there is confusion among students.
9. Students listen from the teacher.

Second core activity : (Students can understand the area and perimeter of a square through pre-formal math task)

1. The teacher gives the following worksheets:

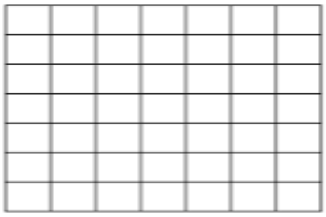

Figure 4. Student Worksheet

   A tools ancak ball has a length of 70 cm and a width of 70 cm. Calculate the area and perimeter of a square if every 10 cm is represented by a square!
2. Student representatives from each group were asked to demonstrate and explain their work.
3. Students inquire about their work.
4. Students listen carefully to the reinforcement from the teacher.

Third core activity : (Students can understand the area and perimeter of a square through formal math task)

1. The teacher gives an assignment to measure the level of students' understanding by giving story questions as follows.
2. There is a wooden block in the shape of a square that has a side length of 125 cm. Find and calculate the area and perimeter of the wooden block!
3. Student representatives from the class are asked to demonstrate and explain the results of their work.
4. Students ask questions about the work done by their friends.
5. Students listen carefully to the reinforcement from the teacher.

Closing:

1. Students conduct questions and answers with the teacher to conclude the

material for the area and perimeter of a square.
2. The teacher closes the lesson by giving thanks, praying together, and greeting.

Table 1. Scenario of Contextual Learning Based on Material Culture Area and Circumference of the Square Through Tools ancak

CONCLUSION

Based on the results and discussion, culture-based contextual learning can be applied through the random making process. This traditional tool is one of the media that can be applied to implement culture-based contextual learning. This is because tools ancak has a physical form that can help students understand mathematics, especially the area and perimeter of a square. In addition, this culture-based contextual learning design is also useful in forming cultured students, maintaining and preserving culture, and instilling the character of students who love culture. Thus, through this integrative learning design, students can learn mathematics, especially the area and perimeter of a square while preserving culture.

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