

## Caping Kalo As Kudus Cultural Heritage To Construct Circle Concept Of Primary School Students

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### Abstract

There are some problems in mathematics education at SD 1 Kaliputu especially in geometry. At the learning process, circle concepts given by teacher orally. Use of learning resources also not optimal, realistic problems that exist in the surrounding environment is not use. As the impact students just memorize by recitation, not construct concept alone, so that conceptual understanding of students very low and meaningful learning can not happen. The aim of this research is to find how can students construct circle concept by using caping kalo as kudus cultural heritage and make meaningful learning.

The research was conducted at fifth grade of SD 1 Kaliputu. Data were collected using observation, documentation and test. The result of this research showed that caping kalo as kudus cultural heritage can construct circle concept of the students and make meaningful learning.

**Keyword:** Caping Kalo, Kudus Cultural Heritage, Circle Concept

### Introduction

Today cultural heritage is marginalized. Cultural heritage values if not maintained properly. Feared to be eroded due to the rapid development of information technology that can be easily and instantly accessible by anyone even for children at elementary school. Children who should be a lot of learning and development activities in accordance with his age.

Based on classroom observation conducted by researcher on mathematics subject, this case also happened at SD 1 Kaliputu. Elementary school students who should be at concrete operational stage not given the appropriate learning process. At geometry learning process, for example at circle material they just memorize by recitation the attributes of circle, not construct concept alone using real problem, so that conceptual understanding of students very low and meaningful learning can not happen. This case contradiction with Piaget theory that children at 6 – 12 years old is in the concrete operational stage (Hernawan, Asra&Dewi, 2010:45). From this theory learning process should be always associated with something concrete, real, close to the students' lives and the environment.

Related to the condition, the writer conduct the research by using Pendidikan Matematika Realistik Indonesia (PMRI) approach with caping kalo (Kudus cultural heritage) as a context in circle material to the fifth grade students of SD 1 Kaliputu. Learning design of this research refers to five characteristic of PMRI. They are: using of context, using of models, using of student's contribution, interactivity, and intertwining (Gravemeijer, 1994).

## Theoretical Framework

### *Attributes of Circle*

Circle material is one of the material which is stated in the primary school based curriculum for the second semester of fifth grade students. The materials are: identify the characteristic of circle. It's about: circle definitions, center point, radius, diameter, reflectional symmetry and rotational symmetry.

Circle is second dimensional shape made by drawing a curve that is always the same distance from a center point ([www.mathsisfun.com](http://www.mathsisfun.com)). The diameter is a straight line that goes across the circle and through the center. It's twice the length of the radius. The radius is the distance from the center point to the edge of the circle. The circumference is the perimeter of a circle. A chord is a line segment with endpoints on a circle. Sector is a section of the circle made by two different radius. Sort of like a piece of pizza or pie. A chord is a line segment that joins two points on the circle ([www.ducksters.com](http://www.ducksters.com)). Circle can be illustrated at figure 1 below.

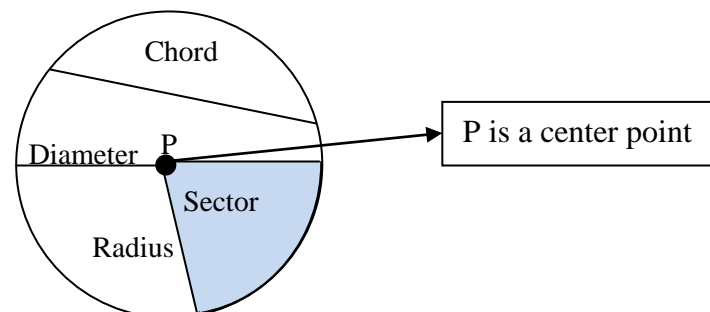


Figure 1. Attributes of circle

Devis at (Leikin, Berman&Zaslavsky, 2000) declared that Symmetry is a model topic for study in school. It is embedded in reality, it is conceptually simple for younger pupils, and concrete examples abound. Its study yields many useful results, applicable in the real world. Equally important it is a rich subject whose study is an excellent practice ground for mathematicians and scientists.

Reflectional symmetry is a type of symmetry in which one half of the object is the mirror image of the other. Rotational symmetry is a type of symmetry in which the shape or image can be rotated some amount and it still looks the same ([www.icoachmath.com](http://www.icoachmath.com)).

### *PMRI Approach*

Realistic Mathematics Education (RME) is a domain-specific instruction theory for the teaching and learning of mathematics (Drijvers et.all, 2013:56). RME in Indonesian called Pendidikan Matematika Realistik Indonesia (PMRI). Freudenthal declared that mathematics is human activity (Hadi, 2005: 19). Student have to given chance to reinvent mathematics concept under adult guidance (Gravemeijer, 1994). De Lange in (Hadi, 2005) stated that in the reinvent concept process have to be developed by exploring many problems in the “real life”. Freudenthal (1991) emphasize that students have to be allowed to be creative and they have to be pushed as to create the ideas and their own strategy.

### ***Caping Kalo: Kudus Cultural Heritage as a Context of Circle's Attributes***

Cultural heritage that is close to students have good potential become a source of learning and meaningful context for learning mathematics. For example, based on research Zuliana (2013) declared that selendang toh watu can be a context for learning mathematics at rectangular area. Learning process can be help students to construct mathematical concept about the area of rectangle. This process also can be grow love to preserve Kudus cultural heritage. The other research Zuliana (2014) said form of plane engklek kapal terbang modification can be construct cube's net concept. Engklek kapal terbang is traditional game from Indonesia and its also one of cultural heritage.

Caping kalo is one of Kudus cultural heritage. Caping in English is called hat. Caping kalo made of woven bamboo. Caping kalo used with Kudus traditional clothes and usually used into kretek dance performance. The surface of woven bamboo can be help to construct circle's attributes, like figure 2 below.



Figure 2. Caping kalo as a context

### **Research Method**

The method that is used in this paper is design research with stage: 1) preparing for the experiment, 2) design experiment, and 3) retrospective analysis Gravemeijer & Cobb (2006).

At the first stage preparing for the experiment made *hypothetical learning trajectory* (HLT). At the second stage design experiment we collected data that will be used to answer the research question and at the last stage retrospective analysis researchers analyzed data obtained from the design experiment stage and using the results of the analysis to develop the next design.

### **Subject**

The subject of this research are students at the fifth grade SD 1 Kaliputu. Students are at the age of 10 – 11 years.

### **Data Collection Techniques**

Data were collected with: documentation, observation, and questionnaires.

## Result and Analysis

### *Preparation for The Experiment*

Some things were done in this stage is discussions with teachers partner who are experienced in: (1) formulating learning goals, (2) designing and setting realistic mathematics with *caping kalo* as a context at circle's attributes learning design, contained in the instructional design of learning : syllabi, lesson plans, student activity sheet, instructional media, teaching aids and instructional materials, (3) plan the activities/learning activities of students and teachers learning management. From that activities then formulated learning trajectory or HLT related circle's attributes material by using PMRI model with *caping kalo* as the context. The HLT in mathematics learning at circle's attributes material presented in table 1 below.

Table 1. HLT at circle's attributes learning design

Goals	Activity	hypothesis	Concept
Students are able to mention circular objects and objects that are not circular	Viewing and observing <i>caping kalo</i> top surface based on the characteristics include circle or not	Students think that <i>caping kalo</i> top surface is circle. But may be there are some students think that the shape of <i>caping kalo</i> is the other plane.	Knowledge about shape of plane
Students are able to mention the attributes of circle.	Viewing and observing <i>caping kalo</i> top surface is circle then find and determine center point, diameter, radius, chord sector and symmetry	Students are able to answer the question truly but may be there are some students inverted in answer	The attributes of circle

### *Design Experiment*

In this stage learning activities that defined in the previous stage was implemented. Researchers assisted by a team of researchers, classroom teachers. In this phase the classroom teacher who is a partner in the research role management observing learning and contribute in filling the questionnaire responses. The research team observed students learning activities, and documented learning activities. The stages of learning as follows.

- a. The use of realistic problem context: *caping kalo*
- b. The use of model for progressive mathematics  
At this stage the researcher uses circle's media and student activity sheets to discover the concepts of circle's attributes.
- c. The use of students construction  
At this stage students construct media that given to get the concept of circle's attributes. The results of students construction subsequently used for the construction of the foundation for mathematical concepts development.
- d. Interactivity and character development  
At this stage occurs social interaction between students and students, students and teachers, and students with other group. In this learning social interaction plays a role to build students characters like appreciate the opinions of others and behave democratically.
- e. Intertwining

### ***Retrospective Analysis***

At this stage the researcher and the teacher conducted a retrospective analysis that aims to reflect and analyze the learning process that has been carried out and also compare between the HLT and instructional design that has been created by the fact that occur during learning. Overall learning process is good. The results and findings in this research are as follows: 1) learning activities of students in finding the concept of circle's attributes belong in good category with average learning activity score of 3.05; 2) management of learning teacher using PMR models with *caping kalo* as a context in good categories with average score of 3.95; 3) students' response to learning is very good with average score of 4.3. Students admitted pleased with the learning of mathematics like this, they are claimed to be more attractive because they become more familiar with cultural heritage and the attributes of Kudus traditional clothing, 4) the response of teachers to the learning process is also very good with average score of 4.3. Teachers feel happy and get new insights to the process of learning mathematics realistic with *caping kalo* as a context.

### **Conclusion**

*Caping kalo* as kudus cultural heritage can construct circle concept of the students and make meaningful learning. The implementation of realistic mathematics learning process with *caping kalo* as a context of circle running smoothly, effectively, student and teacher give good responses.

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