

Developing Mathematical Literacy by Implementing Traditional Games

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Abstract: This study aims to describe that mathematical literacy can be improved by using traditional games. The Indonesian traditional games which were implemented are “Telor Penyok”, “Koba Tiup”, “Dakon”, and “Sret-sretan”. The research method is qualitative descriptive. The data were collected by observation, interview, and documentation. The subjects of this study were 30 students and 5 teachers SD N Kintelan, Yogyakarta. The results of this study were mathematical literacy could be developed by implementing traditional games for elementary school student. There were Understand the problem of the problem given, make a strategy, solve the problem, and communicate he results with conveying evidence.

Keywords: *traditional games, mathematical literacy, ability of mathematical literacy*

INTRODUCTION

Mathematics is a way of thinking. Mathematics provides people with strategies for organizing, analyzing, and synthesizing information. Often symbolizing a real-life problem reduces it to a well-known mathematical procedure, making the problem easier to solve (Reys, 2009), hence mathematical abilities are needed by students. Mathematics is subject for elementary school to college. By learning mathematics, people practice thinking skills, solve problems in everyday life. So how do teachers teach mathematics is a very important thing to note. Research by Ojose (2011), discussed that teachers should understand how to gain understanding by students. This is the only way they will be capable of applying mathematics in real life as adults.

Mathematics can be taught through game-based learning. Traditional games are some of the most effective and interesting games in teaching and learning of mathematics in primary schools (Abisha, 2016: 123). In Indonesia, many traditional games can be used for learning Mathematics. According to Hidayat (in Safitri et al. 2018: 2), traditional games can stimulate a variety of children's developments such as motoric, cognitive, emotional, social, and spiritual aspects of children. Reviewing learning materials and traditional game functions, traditional games are the right media to be integrated into learning activities including learning mathematics (Nazrullah, Rully, 2011).

Mathematics must make sense to children. If children make sense of the mathematics they are learning, they can build on this understanding to learn more mathematics and use the mathematics to solve problems (Reys, 2009). When students are able to analyse, reason and communicate ideas clearly as they perform the mathematical activity, they are considered mathematically literate. Mathematical literacy is crucial for the development of two 21cc as identified by the Ministry of Education, Singapore (MOE): critical thinking and communication skills (Ministry of Education, Singapore, 2010). Mathematical literacy domain is concerned with the capacities of students to analyze, reason, and communicate ideas effectively as they pose, formulate, solve and interpret mathematics in a variety of situations.

The definition of mathematical literacy for PISA is:

“Mathematical literacy is an individual’s capacity to identify, and understand, the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual’s life as a constructive, concerned, and reflective citizen” (OECD, 2003).

“Mathematical literacy is about dealing with “real” problems. That means that these problems are typically placed in some kind of a “situation”. In short, the students have to “solve” a real-world problem requiring them to use the skills and competencies they have acquired through schooling and life experiences (PISA, 2009).

Students' mathematical literacy skills in Indonesia are ranked 62 out of 70 countries (PISA,2009). According to Salim's research (2018), several factors that lower student literacy skills in Indonesia are incomplete learning resources related to mathematical literacy, students are not given examples of problems related to their daily lives, students are rarely accustomed to solving literacy questions, and students are less accustomed to the connection process in solving mathematical problems. Meanwhile, according to Rogers (2012), identity, socio-economic and cultural conditions, ownership of computers, and books are the main factors that influence the achievement of Indonesian students' mathematical literacy.

Traditional games are part of socio-cultural conditions that can be used as a means of improving mathematical literacy. By conducting traditional games, students will be able to understand the concept of mathematics, students and their understanding of the concept of understanding (mathematical concepts) (Prahmana et al. 2012). : 115). This is also reinforced by the results of Pareto's study (2012: 1), which concluded that mathematical literacy can be improved by using games in Sweden.

In the Indonesian context, there are various traditional games, some of which are "Telor Penyok", "Koba Tiup", "Dakon", and "Sret-sretan" which have been developed by Dewi (2019) into traditional games used for learning grade 1 mathematics in a guidebook for teachers. The trial of the guidebook by implementing the traditional game has become the focus of research to describe whether the game can be a means to improve the mathematics literacy of elementary school students.

METHOD

The method of research is a descriptive study. This study aims to describe and analyze whether the game can be a means to improve the mathematics literacy of elementary school students. The research subjects were 30 students and 5 primary teachers in Kintelan Elementary School, Yogyakarta.

The data were collected by (1) observing, which was observed during the implementation of traditional games, (2) the questionnaire, which was distributed to teachers, (3) interviewing which was conducted in an informal setting. The instrumentations of this research were (1) observation guidelines, (2) the questionnaire, (3) interview guidelines

The procedures were (1) observe implementation of the game, (2) interview the teachers. The two-step analysis plan, there were qualitative by analyzing the results of observation data compared with the interview results and questionnaire.

Data that has been gathered then analyzed using descriptive qualitative (Moleong, 2004). The analysis steps of descriptive model data were (1) data description, (2) data reduction, (3) checking data validity, (4) data analysis and interpretation based on substantive theory.

RESULTS AND DISCUSSION

Student ability profiles before play traditional games according to teacher’s assessment

Based on interviews with teachers, the difficulties experienced by class 1 students are to explain and present numbers, students have dominancy to memorize and not understand the context when given different problems.

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Table 1. Developing Mathematical Literacy by Implementing “Telor Penyok” game


Picture	Procedure	Category of Mathematical Literacy	Developing Mathematical Literacy
 <p>Figure 1. Telor Penyok Game</p>	<p>students are divided into groups of 3-8 students</p> <p>The stake is plunged around the parent with a strategy to determine the exact location and amount so that the egg is not taken</p>	<p>Pose mathematics situation</p>	<p>Understand the problem of the problem given</p>
	<p>students who do not become parents set a strategy so that the eggs can be taken at most from the others</p>	<p>Formulate mathematic situation</p>	<p>Make a strategy</p>
	<p>students take eggs and count the numbers</p>	<p>Solve mathematic situation</p>	<p>Solve the problem</p>
	<p>when students succeed in taking it then write down on paper and communicate the results accompanied by reasons</p>	<p>Interpret mathematics situation</p>	<p>Communicate the results with conveying evidence</p>

Table 2. Developing Mathematical Literacy by Implementing “Koba Tiup” game


Picture	Procedure	Category of Mathematical Literacy	Developing Mathematical Literacy
 <p>Figure 2. “Koba Tiup” Game</p>	<p>he game is done in pairs using rubber which is played by applying distributive properties</p>	Pose mathematics situation	Understand the problem of the problem given
	<p>students make a starting line horizontally two sticks are stuck with a distance of more than 2 meters as a place of tens and units</p>		
	<p>the teacher gives a signal by saying numbers</p>	Formulate mathematic situation	Make a strategy
	<p>students throw the rubber from the start line according to the color on the stick value of the place</p>	Solve mathematic situation	Solve the problem
	<p>students communicate the results of numbers</p>	Interpret mathematics situation	Communicate the results with conveying evidence

Table 3. Developing Mathematical Literacy by Implementing “Dakon” game



Picture	Procedure	Category of Mathematical Literacy	Developing Mathematical Literacy
 <p>Figure 3. Dakon game</p>	<p>the game is done by 2 people seeds are placed in the dakon place students put grain into a hole except the opponent's place</p>	Pose mathematics situation	Understand the problem of the problem given
	<p>students determine more or less the right symbol card</p>	Formulate mathematic situation	Make a strategy
	<p>if finished, students determine many numbers</p>	Solve mathematic situation	Solve the problem
	<p>students write results and submit solutions</p>	Interpret mathematics situation	Communicate the results with conveying evidence

Table 4. Developing Mathematical Literacy by Implementing “Sret-sretan” game

Picture	Procedure	Category of Mathematical Literacy	Developing Mathematical Literacy
 <p>Figure 4. Sret-sretan game</p>	<p>the teacher makes a starting line horizontally with a number card</p> <p>the teacher mentions the question</p>	Pose mathematics situation	Understand the problem of the problem given
	<p>students write and work on the answer sheet provided</p>	<p>Formulate mathematic situation</p> <p>Solve mathematic situation</p>	<p>Make a strategy</p> <p>Solve the problem</p>
	<p>students take the banana midrib until it rings loudly and run towards the number card provided</p>	Interpret mathematics situation	Communicate the results with conveying evidence
	<p>students submit answers and reasons</p>		

The result show that mathematical literacy can be developed by implementing all of traditional games. The mathematics literacy category (PISA, 2009) is filled with every game. Developing mathematical literacy as below:

- 1) Understanding the problem, that’s mean student pose mathematics situation
- 2) Make a strategy, that’s mean Formulate mathematic situation
- 3) Solve the problem, that’s mean student solve the solution
- 4) Communicate the results with conveying evidence

CONCLUSION

The conclusion of this study is mathematical literacy can be developed by implementing traditional games for elementary student. The ability consists of understanding the problem of the problem given, making a strategy, solving the problem, communicate the results with conveying evidence.

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