Unnes Journal of Mathematics Education Research

Exploration of Ethnomatematics in the Samin Tribe and Its Relationship with Mathematical Concepts

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Article Info	Abstract
	This study aims to determine the effectiveness of the Contextual learning model nuanced ethnomatematics of Samin Tribe. The subjects of this research were grade VIII of SMP N 4 Ngawen. This type of research was mixed methods. The research design was One Group Pretest Posttest Design. Data collection techniques used tests, observations, documentation, and interviews. Based on the research results, ethnomatematics forms in the Samin tribe contained in traditional ceremonies in the form of the implementation of traditional ceremonies, did not have art, buildings in the form of *Bekuk Lulang's* house, livelihood in the form of farmers (Samin tribal calendar, *taun, tuwan/wulan, dino, wengi , suro, mangso udan, mangso garing*) and breeders (cows and goats), woven in the form of *Klasa Pandan*, woven in the form of a headband (Blangkon), traditional games in the form of *Dakon, delikan* and *jamuran*, traditional food in the form of *Tumpeng* and *Ketupat*. The relationship between ethnomatematic forms of the Samin tribe with mathematical concepts namely number patterns, integer operations, geometry and measurements. The implementation of mathematics learning in SMP with the contextual ethnomatematics nuanced by the Samin tribe was effective with the achievement of KKM.

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INTRODUCTION

Education was the culture and habituation of life with values that were believed to be true (Maharani et al, 2018). Mathematics education as one aspect of education has an important role in improving the quality of education (Pramono, 2017).

Mathematics in daily life could not be separated, because the growth and development of mathematics occurs of the life challenges faced by humans in various regions with different cultural backgrounds so that the result of problem solving/thinking was mathematics itself. Mathematics learned about orderliness, organized structure, mathematical concepts were arranged in a hierarchical, structured and systematic way, starting from the simplest concepts to the mathematics of basic objects studied were abstract, so that they were called mental objects, they were mind objects. The basic objects included: Symbol was a symbol of an object or statement. The concept was a symbol of an abstract idea that was used to classified a group of objects. Symbols and concepts were part of culture so that accordance with what was revealed by Sembiring in Wahyuni (2012) that mathematics was the construction of human culture. The learning process could not be denied that culture has a very important role. Rahman (2014) revealed that mathematics learning was not only to train students' mindset in order to be able to solve problems critically, logically, accurately and precisely, but also to form the personality of students who were skilled in using mathematics in real life. Therefore it was very reasonable with the learning that was associated with culture was expected to make the learning more enjoyable so that students could receive and understood the good teaching material.

In the current era of changes that were happening guarantees cultural continuity and psychological social stability which was characterized by a shift in values, erosion of local culture, waning of traditional values, as well as the development of technology and the addition of foreign cultures that entered and it could erode their own culture. This happened because of a lack of knowledge and understanding of cultural values. Culture as a way of life was shaped by values, traditions, beliefs, material objects, and regions, has a dynamic nature, fundamentally durable in society but also changed in communication and routined social interaction (Williams in Rahayu, 1998: 77). Therefore culture in social life couldnot be separated because culture itself was a reflection of social life in society and likewise culture and education. Culture as an expression of behavior or behavior that was reflected in the process of social life. Education as a foundation for a country that strengthened a nation so that the role of culture and education were very important.

The cultural values contained have many aspects needed in learning such as the values of customs, behavior, objects and others. Cultural values have to iinstilled early in every individual so that each individual could understand, live and appreciate. One of them was *adat samin*. The Samin community was a traditional community group that lived in the border areas of Central Java and East Java, which has a unique culture and held a lot of traditional values (Jumari, et al, 2012). The term of Samin has two meanings, namely, first, derived from the Samin's word. It called *kiratabasa*, namely *tiyang sami-sami* or *sami-sami amin* which meaned that all people were equal or brothers (*sedulur*). They also have the perception that non-Samin people who were willing to interact socially with them were also considered to be *sedulur* (Interview with Icuk Bamban, June 2015; Endrayadi, 2013: 86; Saputra and Subaharianto, 2008: 203 - 204 in Alamsyah, 2015).

Interrelated aspects in mathematics learning, one of which was the relation of mathematics to culture which influenced learning. Mathematics and culture were two things that were closely interrelated (Hardiarti, 2017). Mathematics learning would be more effectively if the example was taken from the cultural context of a particular area (Barton, 1996: 203). A learning, especially in regions that have their own regional cultural language, have to bridge between education and culture, namely ethnomatematics. Ethnomatematics was a new term in mathematics that linked culture with mathematical concepts. The term of ethnomatematics came from the word ethnomatematics which was introduced by D'AAmbrosio, a Brazilian mathematician in 1977. It was formed from the ethno's word, mathema and tics. Ethno refers to recognizable cultural groups, such as ethnic groups in a country and professional classes in society, including their language and daily

habits. Then mathema here meant explain, understanding and managed real things specifically by counting, measuring, classifying, sorting and modeling a pattern that appeared in an environment. The suffix of tics contain artistic meanings in engineering. In terms of ethnomatematics interpreted as mathematics practiced among cultural groups identified as ethnic national societies, labor groups, children of certain age groups and professional classes (D'Ambrosio. 1985: 44-48 in Putri, 2017)

According to Marsigit (2014: 2) the presence of learning innovations was needed so that to learn mathematics could be more fun. In class learning teacher needed to train and accustom students to associated concepts in mathematics or outside mathematics (Romli, 2016: 162). One of the essence of learning was changed in someone because of the experiences (Khomsiatun & Retnawati, 2015). Contextual was one of the model of learning associated with competency-based curriculum and it was quite relevant to be applied in schools. Contextual was a learning concept who the teacher presented real world situation in the classroom and encouraged students to made connections among their own knowledge and their application in life, while students gained knowledge little by little, and from the process of constructing themselves, as a provision to solve problems in their lives (Nurhadi 2004: 16). Thus the purpose of the mathematics learning process was a representation of the learning processes that had been passed by students, so learning was expected to be carried out effectively which was oriented towards the objectives of mathematics education (Bahri, S., P. 2018).

This research aim was to determine the effectiveness of the Contextual learning model nuanced ethnomatematics Samin tribe.

METHOD

This type of research was mixed methods. The research design was One Group Pretest Posttest Design. The population in this research were students of grade VIII SMP N 4 Ngawen. The sampling technique used the Cluster Random Sampling technique, the researcher determined 1 class from grade VIII SMP N 4 Ngawen as the class that would

be used as a research sample would be applied to the contextual learning model. It was class VIII A.

Data collection techniques in qualitative research were, (1) observation in the cultural exploration stage of the Samin Tribe. The researcher used participatory observation, which the researcher was involved in the daily activities of the person who was observed or used as a source of research data. Next (2) interviews were used to obtain information from informants about the Samin Tribe, interview guidelines used in this research were semi-structured and unstructured interviews (3) the documentation of research was photos of activities and the artifacts of Samin tribe.

Quantitative data collection techniques were (1) it was given with the essay test. The essay test was mathematical problem-solving test. The test was given twice which the initial ability test (pretest) and the final ability test (posttest). (2) observation of the implementation learning was given in the observation sheet of the implementation learning to get data about teacher activities. Filling out the observation sheet was done by checking the list. The activity of filling out the observation sheet was done after the learning process was finished. (3) student response questionnaire.

RESULTS AND DISCUSSION

The results of the research include ethnomatematics forms in the Samin tribe community, the relationship among the ethnomatematics forms of the Samin tribe with mathematical concepts, the effectiveness of the Contextual learning model nuanced ethnomatatics of Samin Tribe.

The forms of culture in the Samin tribe were viewed from the observed aspects, namely traditional ceremonies, arts, buildings, livelihoods, plaits, woven, traditional games, traditional foods. For example the form of the Samin tribe building and woven as follows.

Figure 1. Bekuk Lulang Traditional house of Samin tribe (source: neutralnews.com)

Figure 2. Klasa pandan (source: piedeer.com)

The results of the research could be seen in table 1, as follows.

Table 1. Ethnomatematics forms of Samin tribe

No	The obseved aspect	Ethnomatematics form
1	Traditional ceremonies	The time of traditional ceremonies
2	Arts	Did not art
3	Buildings	Bekuk lulang
4	Livehoods	Calender in farming (java) adjust season
5	Woven	Klasa pandan
6	Plaits	Headband (blangkon) and Samin typical clothes
7	Traditional games	Jamuran, dakon (cangkok) and delikan or petak umpet
8	Tradisional foods	Tumpeng and ketupat

In accordance with research conducted by Rachmawati that historic buildings such as traditional houses, building designs, temples, places of worship, residential buildings, filter cloth motifs, traditional games and various forms of buildings which were the humans creations that shape culture (Zaenuri, 2018; Rakhmawati , 2016). It appropriated with Zaenuri and Dwidayanti (2018) who found ethnomatematic values of non-cultural buildings and cultural reserves

in Central Java related to mathematical concepts such as flat structures, space constructions, collections, symmetries, social arithmetic and trigonometry.

The relationship between the cultural forms of the Samin tribe with the mathematical concepts of numbers pattern, geometry and measurements. For example the relationship between the concept of a rectangular number pattern with woven *Klasa Pandan* as follows.
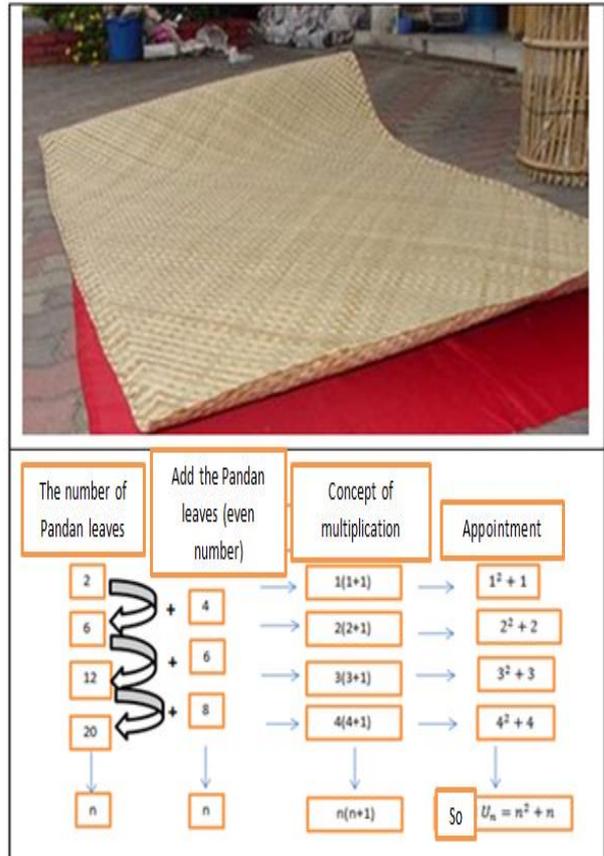

Figure 3. Relationship of the concept of rectangular number patterns with woven *Klasa Pandan*.

The results of the research could be seen in table 2, as follows.

Table 2. The relationship between the cultural forms of the Samin tribe with the mathematical concepts

No	The obseved aspect	Ethnomatematics form	Mathematical consepts in SMP
1	Traditional ceremonies	Suronan	Measuring time
		Gas deso	
		Ngalungi sapi	
		Jamasan	
		Ngantenan	
		Campur bawur	
2	Arts	-	-
3	Buildings	Bekuk lulang house	Trapezoidal
4	Livehoods	Farming and livestock	Measuring time
5	Woven	Klasa pandan	Square and rectangular
6	Plaits	Headband (blangkon)	Tube
		Samin typical clothes	-
7	Traditional games	Dakon	Ball, the concepts of addition, subtraction, multiplication and division on the integer
		Delikan	Pascal number pattern, calculated of the integer consept
		Jamuran	Circle
8	Tradisional foods	Tumpeng	Cone
		Ketupat	Rhombus

In accordance with research conducted by Abi (2015) about ethnomatematics exploration in the Amanuban tribe and its relationship with mathematical concepts showed that mathematical concepts have been owned and lived for a long time. This was realized by ethnomatematics form of the Amanuban tribe which contains many mathematical concepts, especially in the fields of geometry and algebra. Likely Hartoyo (2012) explores and expresses the forms of ethnomatematics in the Dayak cultural community.

The effectiveness of the Contextual learning model nuanced ethnomatematics Samin Tribe was done in the form of a essay test. Initial data analysis used normality test and final data analysis used learning completeness test. In this research used an experimental class with the Contextual learning model nuanced Ethnomatematics of Samin Tribe.

Initial data analysis with the normality test conducted by researcher found that $L_o = 0,0963$ and $L_{tabel} = 0,1658$ so it was concluded $L_o < L_{tabel}$ so that H_o was accepted, it meant that the initial data came from normally distributed populations.

Analysis of the final data in the experimental class could be seen as follows.

This stage was carried out the learning completeness test (KKM). Based on the results of calculations that have been done by researcher, the value of t arithmetic = 6,9203 and t table = 1,700

with a significant level of 5% so that t arithmetic ≥ t tabel = 6,9203 ≥ 1,700 it could be concluded Ho is rejected which means the average of result student learning in contextual learning assisted with supplementary mathematics learning books nuances ethnomatematics of Samin tribe reached more than 65.

The next stage of the Proportion test was used to test classical completeness. The proportion test used in this research was the right-side proportion test with the proportion of students reaching KKM (65) at least 70% of the total number of students in the class. Based on calculations made by researcher obtained $z_{calculated} = 2,29$ and $z_{table} = z_{0,5-\alpha} = 0,17$ with a significant level of 5%. Then it could be concluded that $z_{hitung} > z_{tabel}$ so that H_o is rejected, which meant the proportion of students in mathematics learning with contextual learning assisted with supplementary mathematics learning books nuances ethnomathematics of Samin tribe that reached KKM more than 70 %.

It was accordance with Lestari, S (2014) which proved that the application of contextual learning with real object significantly increased result student learning.

CONCLUSION

The number pattern has a relationship with the ethnomatematics form of Samin tribe in the Delikan traditional game by the concept of a pascal number pattern. The number operation has a relation to the ethnomatematic form of Samin tribe in the Dakon traditional game including the concepts of addition, subtraction, multiplication and division. Geometry concepts related to ethnomatematic form of Samin tribe in the building *of Bekuk Lulang* house included the trapezoidal concept, *Klasa Pandan* woven covered the concept of square and rectangular, headband (*Blangkon*) covered the tube concept, *Dakon* traditional game included the concept of ball, Jamuran traditional game covered the concept of a circle, Tumpeng traditional food included the cone concept, and Ketupat traditional food included the concept of rhombus. Measuring time at traditional ceremonies of the Samin tribe such as *Suronan, Gas deso, Ngalungi Sapi, Jamasan, Ngantenan, Campur Bawur*. The implementation of mathematics learning

with the contextual learning model nuances ethnomatematics of Samin tribe was effective by achieved the KKM of 70%.

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