DLPS (DOUBLE LOOP PROBLEM SOLVING) LEARNING MODEL ESTABLISHING ETHNOMATHEMATICS FOR ANALYZING CAPABILITIES OF PROBLEM SOLVING

Zaenuri[1)] and Fidiana Astutik[2)]
[1)]FMIPA, Universitas Negeri Semarang, Indonesia
[2)]Postgraduate, Universitas Negeri Semarang, Indonesia
[1]zaenuri.mipa@mail.unnes.ac.id

Abstract

The purpose of this research is to analyze the difference of problem solving ability in DLPS learning. The population of this research is the students of Grade V of Elementary School in Gugus Dewi Sartika Mejobo District Kudus City in the academic year 2016/2017. The sample in this research is obtained through cluster random sampling technique. Selected as a sample are grade 5 students of SD 5 Temulus as experimental class 1 (DLPS nuances etnomatematics), grade V SD 3 Temulus as experiment class 2 (DLPS), and grade V SD 2 Temulus as control class (expository). Data problem solving abilities were collected with test instruments, which were tested first. Data were analyzed using one way anova. The results showed, there are differences in problem-solving abilities. Mathematics learning through DLPS model of nuances of ethnomatematics can improve students' problem solving abilities.

Keywords: DLPS model, etnomatematics, problem solving skills

Preliminary

Problem solving is one part of the mathematics curriculum which is very important because in the process of learning and completion, students may gain experience using the knowledge and skills that have been previously owned. However, the facts that exist in the field have not shown that problem solving is a major activity in the learning process of Mathematics, especially at elementary school students. This research focused on problem solving ability of elementary school student mathematics. The analysis was done to find out the difference of problem solving ability in DLPS learning nuance ethnomatematics, DLPS learning and expository learning.

According to Lestari (2015) DLPS learning model is a development or variation of the problem-based learning model, which emphasis on the search for the main cause of the problem. Argyris (2002) suggests that double-loop learning is a kind of investigation that can lead to experiments with new designs and actions that in learning enable educators to create opportunities and opportunities for learners to move forward. The research by Jufri (2015) shows that the DLPS model is able to improve students' level 3 mathematical literacy skills for high and medium KAM categories. The experimental class that obtains learning with the DLPS approach is better than the control class students for high and moderate KAM categories who obtain conventional learning.

In the DLPS learning model, students are asked to state initial problems in accordance with the language and things in the immediate environment. Thus, the appointment of the local culture of the community in the environment will further support the achievement of the objectives and very appropriate when applied with the DLPS learning model itself. According to Sardijo (2005), culture-based learning is a strategy to create a learning environment and design a learning experience that integrates culture as part of the learning process. It is also included in the effort to improve the awareness of the surrounding community (especially students) to know, understand and

love the local culture that exists in their neighborhood. Due to the level of awareness of the local culture of Indonesian society is declining along with the development of science and technology.

Application of matters relating to culture into the learning of mathematics (etnomatematics) will make it easier for students to understand and understand the material and know their own culture. According to Rosa & Orey (2011) ethnomatematic learning is a contextual learning that connects students' way of knowing and learning through a culture embedded in an area with an academic curriculum of Mathematics. Ethnomatics is closely related to the cultural experience of everyday students, so as to improve students' math understanding. The design of learning by mengintergasikan regional culture on learning Mathematics is in accordance with DLPS model because the model of DLPS problems presented are issues relevant to the experience of students relating to daily life.

A Mathematics learning requires an appropriate strategy for learning to be implemented optimally and learning objectives can be achieved. Teachers should be able to create effective, efficient, relevant, and appropriate learning designs in line with student characteristics. Learning design using DLPS model nuanced Ethnomatematic learning can be used as a step to analyze problem solving math.

Method

The focus in this research is the problem solving ability in DLPS model of nuanced ethnomatematics. The population in this research is the students of Grade V of Elementary School in Gugus Dewi Sartika Kecamatan Mejobo Kabupaten Kudus in the academic year 2016/2017. The sample in this research is obtained through cluster random sampling technique. Selected as a sample are grade 5 students of SD 5 Temulus as experimental class 1 (DLPS nuances etnomatematics), grade V SD 3 Temulus as experiment class 2 (DLPS), and grade V SD 2 Temulus as control class (expository).

Data problem solving abilities were collected with test instruments, which were tested first. Data were analyzed using one way anova. The results of the item analysis are presented in Table 1.

Table 1. Test Results and Testing Trials

Item Problem	Validity	Reliability	Exchange Rate	Distinct	Description
1	Valid		Medium	Good	Used
2	Valid		Medium	Good	Used
3	Valid		Medium	Good	Used
4	Not Valid		Easy	Jelek	Not Used
5	Valid	Reliable	Difficult	Jelek	Not Used
6	Not Valid		Medium	Good	Not Used
7	Not Valid		Medium	Good	Not Used
8	Valid		Medium	Good	Used
9	Valid		Difficult	Good	Used
10	Valid		Medium	Good	Used

Results and Discussion

The result of the problem solving ability test of control class, experiment-1, and experiment-2 is presented in Table 2.

Table 2. Problem Solving Ability Tests

Control Class			Eksperiment-1 Class			Eksperiment-2 Class		
No.	Code	Score	No.	Code	Score	No.	Code	Score
1	E-01	70	1	K1-01	77	1	K2-01	78
2	E-02	33	2	K1-02	73	2	K2-02	53
3	E-03	63	3	K1-03	75	3	K2-03	97
4	E-04	48	4	K1-04	75	4	K2-04	72
5	E-05	88	5	K1-05	48	5	K2-05	50
6	E-06	62	6	K1-06	67	6	K2-06	95
7	E-07	90	7	K1-07	87	7	K2-07	82
8	E-08	53	8	K1-08	75	8	K2-08	77
9	E-09	67	9	K1-09	87	9	K2-09	100
10	E-10	53	10	K1-10	87	10	K2-10	88
11	E-11	57	11	K1-11	35	11	K2-11	100
12	E-12	73	12	K1-12	70	12	K2-12	87
13	E-13	67	13	K1-13	63	13	K2-13	92
14	E-14	87	14	K1-14	88	14	K2-14	98
15	E-15	72	15	K1-15	65	15	K2-15	82
16	E-16	83	16	K1-16	88	16	K2-16	73
17	E-17	53	17	K1-17	53	17	K2-17	78
18	E-18	75	18	K1-18	48	18	K2-18	82
19	E-19	55	19	K1-19	50	19	K2-19	95
20	E-20	72	20	K1-20	78	20	K2-20	58
Rata-rata		66,50	Rata-rata		69,45	21	K2-21	65
						22	K2-22	80
						23	K2-23	87
						24	K2-24	97
						Rata-rata		81,92

Normality test results show, data problem solving abilities normally distributed, so that can be tested using inferential statistics. Data analysis techniques use one-way ANOVA at significance level. Criteria of decision making is when Sig <0.05 then H0 rejected. Conversely, H0 is received when Sig is 0.05.

The result of difference test of the mean score of problem solving ability with the help of SPSS 22.0 for windows is presented in Table 3.

Table 3. Test Results Difference Average Score Problem Solving Ability

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1113.063	2	556.531	6.969	.002
Within Groups	4871.375	61	79.859		
Total	5984.438	63			

According to Table 3, the sig value is 0.002 <0.05 so that H0 is rejected. That is, there are differences in problem-solving abilities. For the difference, it will be used anova advanced test (post hoc) is LSD test. LSD test results are shown in Table 4.

Table 4. LSD Advanced Test Results Troubleshooting Capabilities

(I) KELAS	(J) KELAS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
EKSPOSITORI	DLPS	-2.050	2.826	.471	-7.70	3.60
	DLPS ETNO	-9.475*	2.706	.001	-14.89	-4.06
DLPS	EKSPOSITORI	2.050	2.826	.471	-3.60	7.70
	DLPS ETNO	-7.425*	2.706	.008	-12.84	-2.01
DLPS ETNO	EKSPOSITORI	9.475*	2.706	.001	4.06	14.89
	DLPS	7.425*	2.706	.008	2.01	12.84

*. The mean difference is significant at the 0.05 level.

Based on Table 4 it can be argued that there is a difference in the average score of problem-solving abilities of Mathematics among students who are subjected to DLN models of ethnomatematic nuances with students subject to the DLPS model. It is obtained based on the value of significance that is 0.008 <0.05 which causes H0 rejected. That is, there is an average difference in the scores of problem solving skills among students who are subject to DLS models with ethnomatematic nuances with students subject to the DLPS model.

In addition, still in the DLPS class of ethnomatematic nuances, there is also an average difference in the scores of problem-solving abilities among students who are subjected to DLN models of ethnomatematic nuances with students exposed to expository learning. This can be seen from the significance value of 0.001 <0.05. That is, there is an average difference in the scores of problem-solving abilities among students who are subjected to DLN models of ethnomatematic nuances with students exposed to expository learning.

In the DLPS class and expository classes there is an unseen difference in the SPSS output. This can be seen from the significance value of 0.471> 0.05. That is, there is an average difference in the students' problem solving skills score score that is subject to the DLPS model with students exposed to expository learning.

Based on the statistical test by showing that there is a difference of problem solving ability between students who are subjected to DLS model nuanced etnomatematics, students who are subject to DLPS model and students who are exposed to expository learning. Therefore, it can be concluded that the learning of mathematics through DLPS model nuances of ethnomatematics gives a positive influence on the improvement of problem solving ability significantly. The existence of the role of teachers, students, teaching materials nuanced ethnomatematika very related to the improvement of problem solving skills. This is in line with Kurumeh's (2012) study which suggests that ethnomatematic teaching approaches more effectively improve student retention in mathematics subjects than conventional approaches.

Learning done on the three classes of DLPS nuanced ethnomatematic class, DLPS class and expository classes run smoothly and tailored to the RPP that has been prepared by researchers. The provision of the current treatment of learning has a significant impact on the learning outcomes of the three classes.

In DLPS learning nuanced ethnomatematics, students are formed into several heterogeneous groups with members of 4-5 children. Trianto (2007) states that learning by involving groups is easier to find and understand difficult concepts if they are discussing with other members of the group. It is intended that all students can play an active role in the problem solving skills of students. This is in line with research Pimta (2009). problem-solving ability is an important ability of learners who need to be familiarized and also trained to be able to solve problems that exist.

Conclusion

Based on the results of research and discussion can be drawn conclusion, there are differences in problem solving abilities. Mathematics learning through DLPS model of nuances of ethnomatematics can improve students' problem solving abilities.

DAFTAR PUSTAKA

Argyris, C. 2002. “Double loop learning, Teaching and Research”. *Academy of Management Learning and Education Journal*, 1(206): 18.

D’Ambrosio, U. 2006. “The Program Ethnomathematics and the Challenges of Globalization”. *International Journal for the History of Science*. 1(8):74-82.

Kurumeh M.S. *et.al.* 2012. Improving Students Retention in Junior Secondary School Statistic using the Ethno-mathematics Approach in Obi and Oju Local Government Areas of Benue State, Nigeria. *Greener Journal of Education Research*. Vol. 2 (3).

Lestari & Yudhanegara. 2015. *Penelitian Pendidikan Matematika*. Karawang: Refika Aditama.

Pimta, 2009. “Factors Influencing Mathematic Problem-Solving Ability of Sixth

Rosa, M. & Orey, D. C. 2011. "Ethnomathematics: Cultural Assertions and Hallenges Towards Pedagogical Action"**.** *Journal of Mathematics and Culture,* 6(1): 57-78.

Rosa, M. & Orey, D. C. 2011. “Ethnomathematics: The Cultural Aspects of Mathematics". *Revista Latinoamericana de Etnomatemática*, 4(2): 32-54.

Rosa, M. 2013. “Culturally Relevant Pedagogy a an Ethnomathematical Approach”. *Journal of Mathematics & Culture*, 7(1): 74-97

Rosa, M. & Orey, D. C. 2014. “A Theoretical Discussion to Reveal the Principles of Culturally Relevant Education in An Etnomatematical Perspective” *RIPEM*, 1(1): 42-67.

Sardjiyo, 2005. “Pembelajaran Berbasis Budaya: Model Inovasi Pembelajaran an Implementasi Kurikulum Berbasis kompetensi”. *Jurnal Pendidikan*, 6(2): 83-98.

Trianto. 2007. *Model-Model Pembelajaran Inovatif Berorientasi Konstruktivis*. Jakarta : Prestasi Pustaka.