The Effectiveness of Mathematics Learning Based on Javanese Vegetable Salad Context to Improving Students' Higher Order Thinking Skills

by Inter 8

Submission date: 29-Dec-2022 04:13PM (UTC+0700)
Submission ID: 1987256239
File name: Inter_8.pdf (408.3K)
Word count: 5927
Character count: 33090

Pegem Journal of Education and Instruction, Vol. 13, No. 1, 2022 (pp. 84-91)

RESEARCH ARTICLE WWW.PEGEGOG.NET

The Effectiveness of Mathematics Learning Based on Javanese Vegetable Salad Context to Improving Students' Higher Order Thinking Skills

Sardulo Gembong[1], Ika Krisdiana[2], Edy Suprapto[3], Reza K. Setyansah[4], Sri A. Widodo[5], Wasilatul Murtafiah[6*]

[1-4,6]Department of Mathematics Education, Universitas PGRI Madiun, East Java, Indonesia

[5]Department of Mathematics Education, Universitas Sarjanawiyata Tamansiswa, Yogyakarta

Abstract

Learning mathematics requires real situations that are often faced by students. using the context that is around students for learning mathematics can make the context of mathematics easy to reach by students. This study meant to determine the effectiveness of mathematics learning based on Javanese vegetable salad context in increasing students' high order thinking skill through teaching assistance activities. This research uses quasi-experimental methods. Descriptive data were taken from a post-test of 93 students in the control group and 96 students in the experimental group. The experimental class applies Javanese vegetable salad context to mathematics learning, while the control class does not use Javanese vegetable salad context. Data analysis was performed descriptively and t-test through SPSS 25. The results showed that lecturers, teachers and students gave positive responses respectively 83.22%; 85.33%; 86.59%. The post-test results were analyzed using a t-test through SPSS 25 which showed significant difference between the two classes in their post-test scores. Thus, this study shows that mathematics learning based on Javanese Vegetable Salad Context is effective in increasing students' high order thinking skill.

Keywords: Effectiveness, Ethnomathematics, Javanese Vegetable Salad, High Order Thinking Skill.

Introduction

In Indonesia, the self-learning policy in 2020 creates a new paradigm for education (Director General of Higher Education Ministry of Education and Culture, 2020). The independent learning program in higher education is expected to provide independence in the management of higher education according to its characteristics. so that independent learning projects cause learning governance between universities to have different administrative, managerial, and learning processes. The success of this project is seen from the level of achievement of the 8 key performance indicators set by the Indonesian ministry of education (Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754/P/2020 concerning Key Performance Indicators, 2020). For the achievement of key performance indicators related to student's learning experiences outside campus. Students who take part in the teaching assistance program in schools have been equipped with knowledge of ethnomathematics in mathematics learning. Teaching mathematics should be designed to increase students' interest in learning. Procedural learning can result in students having difficulty in solving contextual problems (Ozdemir & Sahal, 2018). Therefore, the design of mathematics learning needs to be linked to real life, close to the student's culture. Contextual learning that connects mathematical concepts with culture is called ethnomathematics (D'Ambrosio, 1985, 2001, 2004). Contextual learning in the familiar environment can provide learning motivation and meaning to support students' higher order thinking skills.

Higher order thinking is a skill that must be possessed by students as the 21st century skill (Scott, 2015). Higher order thinking skills (HOTS) need to be trained to students through mathematics learning (Murtafiah et al., 2019; Sa'dijah et al., 2021). Higher order thinking skills can be taught through learning by giving mathematical problems (Murtafiah et al., 2020). The mathematical problems given can be at the cognitive level of analysis, evaluation and creation. This is in line with the revised Bloom's taxonomy which states that Higher order thinking is a cognitive aspect at the levels of analysis (C4), evaluation (C5), and creation (C6) (Anderson et al., 2001).

The fact shows that most mathematics teachers are still rarely designed specific materials to teach higher order thinking (Murtafiah et al., 2020). Students' ability to solve

Corresponding Author: wasila.mathedu@unipma.ac.id

https://orcid.org: 0000-0003-3539-5332

How to cite this article: Gembong S, Krisdiana I, Suprapto E, Setyansah RK, Widodo SA, Murtafiah W (2022). The Effectiveness of Mathematics Learning Based on Javanese Vegetable Salad Context to Improving Students' Higher Order Thinking Skills. Pegem Journal of Education and Instruction, Vol. 13, No. 1, 2022, 84-91

Source of support: Nil.

Conflict of interest: None.

DOI: 10.47750/pegegog.13.01.10

Received : 19.04.2022

Accepted : 05.07.2022 **Published:** 01.11.2022

mathematical problem in the form of HOTS questions is still low (Murtafiah et al., 2021; Yaniawati, 2013). In addition, the results of preliminary studies conducted by students during their teaching assistance program in schools show that students' ability to solve math problems (higher order thinking questions) is still very limited. Most students still have difficulty in understanding the questions, especially if the questions are mathematical story questions. Students still have difficulty in understanding the problem and choosing strategies for problem solving (Widodo et al., 2020; Widodo et al., 2019). This indicates that students' higher order thinking skills are still far below the standard.

To overcome this problem, through teaching mentoring activities in schools, the department of mathematics education provides recommendations to students to apply ethnomathematics-based mathematics learning (Alvian et al., 2021). Ethnomathematics is a science that focuses on mathematics in culture and everyday life (Irfan et al., 2019). By using the concept of vertical and horizontal mathematization, it is hoped that students can accept abstract mathematical concepts. In addition, by using an ethnomathematics approach for learning mathematics, students are expected to be able to accept mathematical concepts that are universal, and can be implemented in everyday life. One of the ethnomathematics in the scope of special food, in Java among them is *Pecel*. This is a special food in the form of vegetable salad with peanut sauce. This type of food is commonly found in Central Java, East Java, Yogyakarta, Jakarta, and a small part of West Java. Because this food is often found in Java, then this special food *pecel* is called Javanese vegetable salad. The ethnomathematics that can be taken from the Javanese vegetable salad are some mathematical concepts as shown in Figure 1.

The special food Javanese vegetable salad can be used to teach mathematics on the concepts of 2D shapes, solid spaces, measurements and social arithmetic. Through mathematics learning activities that are linked to real contexts and close to students' culture, it is expected to help students to understand problems in order to improve higher order thinking skill and students' learning achievement in mathematics. This is in line with the statement that many learning activities (e.g., content exploration, leading class discussions) require students to make explicit connections between context-based activities and standardized mathematics learning (Naresh, 2015). Mathematics learning is more effective and meaningful if it starts with familiar learning situations, utilizing familiar mathematical practices found in the students' socio-cultural environment (Matang, 1998).

Figure 1: Mathematics with Javanese vegetable salad

Through mathematics, students can improve their higher order thinking skills in order to solve problems in everyday life using mathematical concepts. Therefore, it is necessary for students to apply mathematics learning based on Javanese vegetable salad context to improve students' High Order Thinking Skills (HOTS). Through the application of ethnomathematics-based mathematics learning in schools, it is important to reveal the effectiveness of its implementation. Thus, the purpose of this study is to determine the effectiveness of mathematics learning based on Javanese vegetable salad context to improve students' HOTS.

Method

This study is designed to determine the effectiveness of mathematics learning with Javanese vegetable salad context to improve students' high order thinking skill. This research is a quantitative research with quasi-experimental method. The quasi-experimental method is characterized by a control group and an experimental group and the subject is randomly assigned to one of the groups (Creswell, 2012a; 2012b). The experimental method was used to determine students' ability to solve mathematical problems in the form of students' High Order Thinking Skills (HOTS) after applying ethnomathematics-based mathematics learning using Javanese vegetable salad context.

Research Design

Experimental research methods are used to determine the effect of certain treatments on the object under observation in controlled conditions. The use of this method is to investigate the sample and to use certain instruments for data collection. This method has statistical data analysis to test hypotheses (Creswell, 2012a). The experimental research design is a posttest-only control group design as shown in Table 1. In this design, subjects were randomly assigned to groups and exposed as independent variables were given a post test. Posttest values were then compared to determine the effectiveness of the treatment.

Table 1: Post-Test Only Control Group Design

Group	*Treatment*	*Post-Test*
Experimental	X	Y
Control	-	Y

Note:
X = Mathematics learning with Javanese vegetable salad context
Y = Posttest (students' higher order thinking skills)

Participants

The research sample was 189 of 8th grade junior high school students in Madiun, East Java, Indonesia. they are spread over 3 junior high schools that are used as research sites. The research sample was selected by means of systematic cluster random sampling. cluster method is used to group students based on schools in Madiun. in this area there are 10 junior high schools that can be used for research sites with the criteria that they have implemented a teaching assistance program project for the Independent Campus. while the systematic sampling method is carried out randomly for one group (in this case the class at the school that is used as the research site), while the other samples are based on a certain interval that is the same as the sample selected in the previous group. With this condition, it can be assumed that the cognitive abilities in mathematics are homogeneous or balanced.

Data Collection Tools

The research data were collected from questionnaires and tests. The questionnaire instrument was used to collect data on the lecturer, teachers and students' responses, while the test instrument was used to collect data on students' students' higher order thinking skills.

- *Questionnaire*: This instrument was validated constructively by 3 lecturers of mathematics education. As for the validation results, a construct index of 3.52 was obtained with a good category.
- *Test*: This instrument was tested to determine content validity, level of difficulty, discriminatory power and reliability. The test instrument consists of 30 multiple choice questions made in the category of high order thinking problem with 4 alternative answers. The trial test was performed on 74 respondents outside the sample used in the study. Content validity includes material aspects, construction aspects and language aspects. The content validity test was performed by three validators, 2 mathematics teachers and 1 mathematics education lecturer. The content validity test result showed that all items were stated in accordance with the criteria to say that the test instrument is valid. The difficulty level of the items shows that there is 1 item which is not appropriate because the index of difficulty level is more than 0.7 which is item number 19. While the other items are included in the categories that are not too easy neither too difficult. The calculation of the discriminatory power results of 30 items show that there are 5 items with poor distinguishing power (D 0.3), items number 5, 9, 13, 19, and 26. After the content validity test was performed, the test difficulty level, and discriminating power test, there are 25 items that meet the criteria. They are numbers 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 27, 28, 29, and 30. There are 5 questions that are not used for research, namely numbers 5, 9, 13, 19, and 26. Furthermore, from 25 items that meet the criteria the reliability test was then performed. Based on the results of the reliability test, the calculation of the reliability index results was 0.852 or = 0,852. Because is more than 0.7, it is concluded that the learning achievement test instrument is reliable (Sugiyono, 2017).

Data Collection

This research begins with an analytical study or needs analysis consisting of curriculum analysis, context analysis of Javanese vegetable salad to obtain learning objectives. Furthermore, from the learning objectives, the research team was able to design mathematics teaching materials using the Javanese vegetable salad context. To find out the effectiveness of these teaching materials, the research team decided to try them out on students. This trial process involved two groups, namely the control group (the group that used mathematics teaching materials without the context of Javanese vegetable salad) and the experimental group which used mathematics teaching materials in the context of Javanese vegetable salad. A summary of the research procedure can be seen in Figure 2.

Data Analysis

The quasi-experimental method data in this study were the students' post-test scores which were analyzed using statistical calculations. To see the effect of ethnomathematical learning based on Javanese vegetable salad context on its significance, a different test analysis was performed using a t-test. The treatment was considered to have a significant effect if a significant difference was found between the experimental and control groups in their post-test scores. Before analyzing the data through the t-test, normality and homogeneity tests were first performed. The normality test aims to see whether the data distribution is normally distributed, and the homogeneity test aims to test the similarity between the two groups; experimental and control groups.

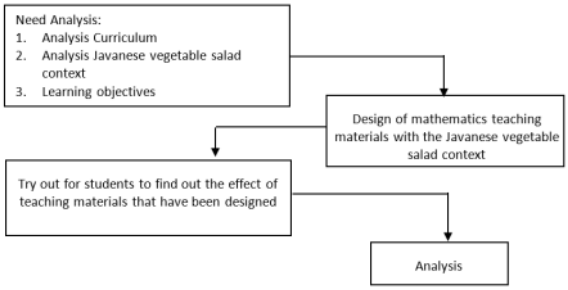

Fig. 2: Procedure of This Research

Findings

Subject Response

Response data is used to determine the extent to which the implementation of mathematics learning Based on Javanese Vegetable Salad Context through the independent teaching assistance program for independent campus learning. The following is a description of the responses results from the advisors, supervising teachers and students participating in teaching assistance at schools. The responses are presented in Table 2.

The questionnaire result in table 2 shows that from 14 supervisors stated that in the application aspect, a positive response 83.93% was obtained. The aspect of constrain obtained a positive response of 75.48% while the aspect of knowledge obtained a positive response of 90.48%. Overall, the supervisor gave a positive response of 83.22%.

Furthermore, the responses from supervising teachers at schools are presented as shown in Table 3. The Results of questionnaire analysis taken from 30 supervising teachers presented in table 3 shows that positive response 87.50% was obtained from the application of the mathematics learning based Javanese Vegetable Salad. The aspect of constraints obtained a positive response of 76.67% while the aspect of knowledge obtained a positive response of 91.11%. Overall, the supervisor gave a positive response of 85.33%

The data presented in Table 4 shows that based on the results of the questionnaire analysis of the application of mathematics leaning based Javanese Vegetable Salad as a whole from 91 students stated that in the aspect of application, a positive response was obtained by 86.54% while the aspect of constraints obtained a positive response of 80.22%. In the aspect of knowledge obtained a positive response of 93.04%. Overall, the supervisor gave a positive response of 86.59%.

The percentage of responses from advisors, supervisors and students is presented in Figure 2. In the Figure 2 above shows that the advisors, supervisors and students gave a positive response of more than 80%. The positive responses were 83.22%, 85.33%, and 86.59% respectively.

Hypothesis Test

Before testing the hypothesis, the normality and homogeneity tests were conducted. The normality test aims to determine whether the distribution of post-test value data in the experimental class and control class is normally distributed. Table 5 presents the results of the post-test data normality test using the Kolmogorov-Smirnov on SPSS 25. Based on the significance level of the test of $\alpha = 0.05$, Table 5 shows class group with conventional treatment (not based on Javanese Vegetable Salad), obtained a significance level of $0.054 > 0.05 = \alpha$. This means that the data comes from a normally distributed population. The class with mathematics leaning based Javanese Vegetable Salad, a significance level of $0.138 > 0.05 = \alpha$ is obtained. This means that the data comes from normally distributed population.

The homogeneity test was then conducted. This homogeneity test aims to compare two data groups (ie, experimental and control groups), to see whether they have the same variance. The two groups can be compared only if they have the same variance. If the data is homogeneous, the t-test for the assumption of the same variance can be performed. Otherwise, the same variance is not assumed that t-test is applied when the data is not homogeneous. The data is said to be homogeneous if the sign value > 0.05 with a significance level of 5% (0.05). The following table presents the results of the homogeneity test using SPSS 25. Based on Table 6, the results of the homogeneity test above show that

Table 2: Advisors' Response to the Implementation of mathematics learning Based on Javanese Vegetable Salad Context

Aspect		*Lecturer*	
Positive (%)		*Positive (%)*	*Negative (%)*
Application	**Development of learning tools**	**85.71**	**14.29**
	Implementation in class	**78.57**	**21.43**
	Media usage	**85.71**	**14.29**
	Students' learning motivation	**85.71**	**14.29**
Percentage of Implementation Aspect		**83.93**	**16.07**
Obstacles	**No difficulty in applying**	**80.00**	**20.00**
	Students have no trouble	**75.00**	**25.00**
	No difficulty in making media	**71.43**	**28.57**
Percentage Aspect Constraint		**75.48**	**24.52**
Knowledge	**Student involvement in thinking HOTS**	**78.57**	**21.43**
	Use of scientific approach	**92.86**	**7.14**
	Involving culture in the student learning environment	**100.00**	**0.00**
Percentage of Knowledge Aspect		**90.48**	**9.52**
Total Percentage		**83.22**	**16.78**

Table 3: The Advisory Teacher's to the Implementation of mathematics learning Based on Javanese Vegetable Salad

Aspect *Positive (%)*		*Response*	
		Positive (%)	*Negative (%)*
Application	Development of learning tools	90.00	10.00
	Implementation in class	93.33	6.67
	Using media	90.00	10.00
	Students' learning motivation	76.67	23.33
Percentage of Implementation Aspects		87.50	12.50
Obstacles	No difficulty in applying	73.33	26.67
	Students have no trouble	80.00	20.00
	No difficulty in making media	76.67	23.33
Percentage Aspect Constraint		76.67	23.33
Knowledge	Student involvement in thinking HOTS	76.67	23.33
	Use of scientific approach	96.67	3.33
	Involving culture in the student learning environment	100.00	0.00
Percentage of Knowledge Aspect		91.11	8.89
Total Percentage		85.33	14.67

Table 4: Student Response to the Implementation of mathematics leaning based Javanese Vegetable Salad

Aspect *Positive (%)*		*Response*	
		Positive (%)	*Negative (%)*
Implementation	**Development of learning tools**	**87.91**	**12.09**
	Implementation in class	**89.01**	**10.99**
	Using media	**86.81**	**13.19**
	Students' learning motivation	**82.42**	**17.58**
Percentage of Aspects of Implementation		**86.54**	**13.46**
Obstacles	**No difficulty in applying**	**84.62**	**15.38**
	Students have no trouble	**79.12**	**20.88**
	No difficulty in making media	**76.92**	**23.08**
Percentage Aspect Constraint		**80.22**	**19.78**
Knowledge	**Student involvement in thinking HOTS**	**90.11**	**9.89**
	The use of scientific approach	**89.01**	**10.99**
	Involving culture in the students' learning environment	**100.00**	**0.00**
Percentage of Knowledge Aspect		**93.04**	**6.96**
Total Percentage		**86.59**	**13.41**

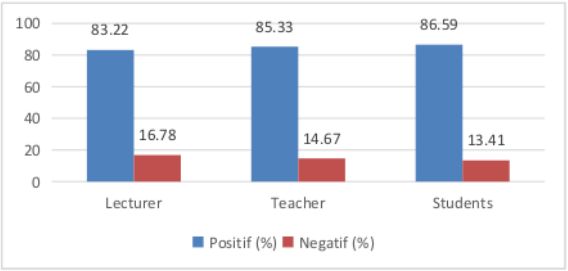

Fig. 2: Lecturer, Teacher and Student Response

the significance level is 0.610 > 0.05 = α. This means that the research data is homogeneous.

After the post-test value data is declared normal and homogeneous, it is necessary to test the hypothesis with a difference analysis test using the t-test on SPSS 25 with a significance level of 5% (0.05) to see the significance of the treatment. The criteria for not supporting H0 are "H0 does not support if the Sig value < 0.05", indicating the difference between the experimental and control groups in their post-test scores. Significant difference in the result indicates that the treatment has a significant effect on the experimental group. The treatment being questioned is the

Table 5: Result of Normality Test on Post-Test Data

	Kolmogorov-Smirnova			*Shapiro-Wilk*		
Group	*Statistic*	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Control	.091	93	.054	.975	93	.070
Experiment	.083	93	.138	.980	93	.178

Table 6: Homogeneity Test Results

Variable		*Levene Statistic*	*df1*	*df2*	*Sig.*
HOTS Skills	Based on Mean	.261	1	187	.610
	Based on Median	.235	1	187	.629
	Based on Median and with adjusted df	.235	1	186.449	.629
	Based on trimmed mean	.235	1	187	.628

Table 7: Results of Independent Sample t-Test

Variable	**F**	**Sig**	**T**	**df**	**Sig.**	**Mean difference**
Equal variances assumed	**.261**	**.610**	**-5.946**	**187**	**.000**	**-9.572**
Equal variances not assumed			**-5.950**	**186.941**	**.000**	**-9.572**

Table 8: Post-Test Group Mean Score

Group	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Control	93	55.70	10.782	1.118
Experimental	96	65.27	11.332	1.157

application of a reversible problem-solving approach in a learning process. Because the homogeneous data, the t-test for the assumption of the same variance is used. The following table shows the results of the t-test for the assumption of the same variance through SPSS 25 to test the hypothesis of this study.

Based on Table 7, the observed t value is -5.964 with p = 0.00. It appears that $p < 0.05 = \alpha$, meaning that H0 is rejected. Means that the value of the conventional class and experiment with mathematics learning based Javanese salad context is not the same. By comparing the averages, it is clear that the average ethnomathematics class score (65.27) is better than the conventional class average (55.70).

Thus, the application of mathematics learning based on Javanese Vegetable Salad has an effect on students' HOTS. In addition, to support this finding, the mean post-test scores between the two groups, as presented in Table 8.

The mean post-test score in the experimental group was 65.27 while the control group was 55.70. It is clear that the mean score of the experimental group is significantly higher than that of the control group, and thus, it shows a significant difference between the post-test scores of the students in the control and experimental groups.

Discussion

Based on the results of the response data and hypothesis testing, the implementation of ethnomathematics-based learning can be said to be effective. Advisors, supervising teachers and students gave more than 80% positive responses, namely 83.22%, 85.33%, and 86.59%, respectively. The implementation of ethnomathematics-based learning through teaching assistance activities for the independent campus learning program based on the responses given by lecturers, teachers and students shows that the implementation of learning run well. This result is in previously research stated that through ethnomathematics, teacher can teach mathematics effectively (Matang, 1998). Ethnomathematics is an approach to teaching and learning in term of content and method that activates the student's prior knowledge, background, the role of the environment as well as past and present experiences where this approach can be in practice (D'Ambrosio, 2001).

In teaching assistance activities, students apply ethnomathematical-based learning which includes developing devices, implementing it in class, using media and motivating students. The application of ethnomathematical-based learning allows us to see a different reality and gives us insight into mathematics holistically (Rosa & Orey, 2010). Through the application of ethnomathematical-based learning, students gain knowledge as a provision to become a teacher. Mathematical knowledge is important for a teacher candidate to become a professional future teacher (Kleickmann et al., 2015; Muhtarom et al., 2019; Youchu, 2016). Students can find out the involvement of the application of ethnomathematics-based learning with students' HOTS, the use of learning approaches and cultures close to students. This is in line with the statement that being a teacher must have knowledge of students, content and pedagogics (Ball et al., 2008; Fisher et al., 2018; Hill et al., 2008; Shulman, 1987). The relationship between mathematical content and the culture close to students needs to be known by students to ensure that they can teach math concepts well (Muhtadi et al., 2017).

The application of ethnomathematics-based learning through teaching assistance also encountered problems, such as some students who had some difficulties in applying and in selecting the media. The difficulties experienced by some students are influenced by their abilities and knowledge related to pedagogics and content. The link between how to teach mathematics content to students is an ability that teacher's candidates must possess (Ball et al., 2008; Hill et al., 2008). In addition to students, there are some students who still have difficulty in understanding the material. This is due to the selection of a cultural context that is less appropriate or less close to students. The close relationship between students' experiences with the learning context is an important thing that can influence students in understanding the material. By teaching mathematics through real contexts that are close to students, it can help students to understand the material (Haryoto & Narimo, 2013; Samo et al., 2017; Widjaja, 2013).

Student learning outcomes through the application of ethnomathematics-based learning are better than classes which are taught without ethnomathematics. This result is in previous research that ethnomathematics can teach mathematics well (Riggs, 2013). The ethnomathematical perspective is a component of culturally relevant education which proposes teachers to contextualize learning by relating mathematics content to students' culture and experiences (Torres-Velasquez & Lobo, 2004). The special food od Javanese Vegetable Salad is a culture close to students because it is considered that junior high school students in Madiun know and have enjoyed the food. Through the ethnomathematics of Javanese vegetable salad, concepts about flat shapes, spatial shapes, comparisons and social arithmetic can be taught. This is also in line with some cultures that can be used to teach mathematics (Maryati & Prahmana, 2019; Nugraha et al., 2020; Risdiyanti & Prahmana, 2018).

Conclusion

Mathematics learning based on Javanese vegetable salad context is said to be effective. This is marked by several aspects, including: (1) Advisors gave a positive response of 83.22% to the application of ethnomathematics-based learning in teaching assistance programs in schools, (2) Supervising teachers gave a positive response of 85.33 % of the application of ethnomathematics-based learning wit Javanese vegetable salad, (3) Students gave a positive response of 86.59% to the application of ethnomathematics-based learning with Javanese vegetable salad, (4) Students' achievement in learning mathematics taught by ethnomathematics-based learning is better than students who are not taught by ethnomathematics-based learning.

Suggestion

Rrelated to the research results obtained that learning mathematics using the Java salad context has a positive (effective) effect on the HOTS Skill in in 8th grade junior high school students, it is hoped that the teacher can use the Javanese vegetable salad in learning mathematics. In addition, learning mathematics in the Javanese vegetable salad incorrectness can be implemented in other areas that have special food characteristics of Javanese vegetable salad.

Acknowledgement

This Research was funded by Mınistry of Education and culture in Indonesian. İn addition, we thank the Universitas PGRI Madiun, and Universitas Sarjanawiyata Tamansiswa for the support of this research

Limitation

This study was only conducted on 8th grade junior high school students in the Madiun area, so it can only be generalized to 8th grade junior high school students in the Madiun area. even though this special food, has spread almost throughout the island of Java such as Central Java, Yogyakarta, and Jakarta. So, it is necessary to look at the effectiveness of the Java salad context for learning mathematics in other areas

References

Alvian, D. N, Agustito, D., Astuti Arigiyati, T., Harini, E., & Widodo, S. A. (2021). Identifying geometrical objects in Sumur Gumuling Tamansari: An ethnomathematics analysis. *Journal of Physics: Conference Series*, *1778*(1), 012021. https://doi.org/10.1088/1742-6596/1778/1/012021

Anderson, L., Krathwol, D. R. Airasian, P. W. Cruikshank, K. A. Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (2001). *A Taxonomy for Learning, Teaching and Assessing: a revision of Bloom's taxonomy of educational objectives*. Longman.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, *59*(5), 389–407. https://doi.org/10.1177/0022487108324554

Creswell, J. W. (2012a). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (Fourth). Pearson.

Creswell, J. W. (2012b). *Research Design Qualitative, Quantitative, and Mixed Second Edition*. Sage Publication.

D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. *For the Learning of Mathematics*, *5*(1), 44–48.

D'Ambrosio, U. (2001). What is Ethnomathematics, and How Can it Help Children in School? *Teaching Children Mathematics*, *7*(6), 308–310.

D'Ambrosio, U. (2004). Peace, social justice, and ethnomathematics. *The Montana Mathematics Enthusiast, Monograph 1*, 25–34.

Director General of Higher Education Ministry of Education and Culture. (2020). *Buku Panduan Merdeka Belajar - Kampus Merdeka*. https://doi.org/10.31219/osf.io/ujmte

Fisher, M. H., Thomas, J., Schack, E. O., Jong, C., & Tassell, J. (2018). Noticing numeracy now! Examining changes in preservice teachers' noticing, knowledge, and attitudes. *Mathematics*

Education Research Journal, *30*(2), 209–232. https://doi.org/10.1007/s13394-017-0228-0

Haryoto, S., & Narimo, S. (2013). Contextual Math Learning Based on Lesson Study Can Increase Study Communication. *International Journal of Education*, *5*(4), 48. https://doi.org/10.5296/ije.v5i4.4440

Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge : Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, *39*(4), 372–400. https://doi.org/Article

Irfan, M., Slamet Setiana, D., Fitria Ningsih, E., Kusumaningtyas, W., & Adi Widodo, S. (2019). Traditional ceremony ki ageng wonolelo as mathematics learning media. *Journal of Physics: Conference Series*, *1175*(1). https://doi.org/10.1088/1742-6596/1175/1/012140

Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754/P/2020 concerning Key Performance Indicators. (2020)

Kleickmann, T., Richter, D., Kunter, M., Elsner, J., Besser, M., Krauss, S., Cheo, M., & Baumert, J. (2015). Content knowledge and pedagogical content knowledge in Taiwanese and German mathematics teachers. *Teaching and Teacher Education*, *46*, 115–126. https://doi.org/10.1016/j.tate.2014.11.004

Maryati, & Prahmana, R. C. I. (2019). Ethnomathematics: Exploration of the muntuk community. *International Journal of Scientific and Technology Research*, *8*(6), 47–49.

Matang, R. (1998). The role of ethnomathematics and reflective learning in mathematics education in Papua New Guinea. *Directions: Journal of Educational Studies*, *20*(2), 22–29.

Muhtadi, D., Sukirwan, Warsito, & Prahmana, R. C. I. (2017). Sundanese Ethnomathematics : Mathematical Activities In Estimating, Measuring , And Making Patterns. *Journal on Mathematics Education*, *8*(2), 185–198.

Muhtarom, M., Juniati, D., & Siswono, T. Y. E. (2019). Examining Prospective Teachers' Belief and Pedagogical Content Knowledge Towards Teaching Practice in Mathematics Class: a Case Study. *Journal on Mathematics Education*, *10*(2), 185–202. https://doi.org/10.22342/jme.10.2.7326.185-202

Murtafiah, W., Sa'dijah, C., Chandra, T. D., & Susiswo. (2020). Exploring the Types of Problems Task by Mathematics Teacher to Develop Students' HOTS. *AIP Conference Proceedings 2215*, *060018*(April), 1–7.

Murtafiah, W., Sa'dijah, C., Chandra, T. D., & Susiswo, S. (2019). Decision making of the Winner of the National Student Creativity Program in Designing ICT-based Learning Media. *TEM Journal*, *8*(3), 1039–1045. https://doi.org/10.18421/TEM83-49

Murtafiah, W., Setyansah, R. K., & Nurcahyani, D. A. (2021). Kemampuan Komunikasi Matematis dalam Menyelesaikan Circle Problem Berdasarkan Self-Confidence Siswa SMP. *Jurnal Elemen*, *7*(1), 130–145. https://doi.org/10.29408/jel.v7i1.2785

Naresh, N. (2015). The role of a critical ethnomathematics curriculum in transforming and empowering learners. *Revista Latinoamericana de Etnomatemática*, *8*(2), 450–471.

Nugraha, T., Maulana, M., & Mutiasih, P. (2020). Sundanese Ethnomathematics Context in Primary School Learning. *Mimbar Sekolah Dasar*, *7*(1), 93–105. https://doi.org/10.17509/mimbar-sd.v7i1.22452

Ozdemir, A. S., & Sahal, M. (2018). The Effect of Teaching Integers through the Problem Posing Approach on Students' Academic Achievement and Mathematics Attitudes. *Eurasian Journal of Educational Research*, *18*(78), 1–21. https://doi.org/10.14689/ejer.2018.78.6

Riggs, R. (2013). The role of tribal elder in teaching calculus through an ethnomathematical lens. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, *73*(8-A(E)), No-Specified.

Risdiyanti, I., & Prahmana, R. C. I. (2018). Ethnomathematics: Exploration in Javanese culture. *Journal of Physics: Conference Series*, *943*(1). https://doi.org/10.1088/1742-6596/943/1/012032

Rosa, M., & Orey, D. C. (2010). Ethnomodeling : a Pedagogical Action for Uncovering Ethnomathematical Practices. *Journal of Mathematical Modelling and Application*, *1*(3), 7011–7020.

Sa'dijah, C., Murtafiah, W., Anwar, L., Nurhakiki, R., Tejo, E., & Cahyowati, D. (2021). Teaching Higher-Order Thinking Skills in Mathematics Classrooms: Gender Differences. *Journal on Mathematics Education*, *12*(1), 159–180. https://doi.org/http://doi.org/10.22342/jme.12.1.13087.159-180

Samo, D. D., Darhim, D., & Kartasasmita, B. (2017). Developing Contextual Mathematical Thinking Learning Model to Enhance Higher-Order Thinking Ability for Middle School Students. *International Education Studies*, *10*(12), 17. https://doi.org/10.5539/ies.v10n12p17

Scott, C. L. (2015). *What Kind of Learning for the 21st Century?*

Shulman, L. (1987). Knowledge and Teaching: Foundations for the new reform. *Harvard Educational Review*, *57*(1), 1–22.

Sugiyono. (2017). *Metode Penelitian & Pengembangan*. Alfabeta.

Torres-Velasquez, D., & Lobo, G. (2004). Culturally responsive mathematics teaching and English language learners. *Teaching Children Mathematics*, *11*, 249–255.

Widjaja, W. (2013). The use of contextual problems to support mathematical learning. *Journal on Mathematics Education*, *4*(2), 151–159. https://doi.org/10.22342/jme.4.2.413.151-159

Widodo, S. A., Irfan, M., Trisniawati, T., Hidayat, W., Perbowo, K. S., Noto, M. S., & Prahmana, R. C. I. (2020). Process of algebra problem-solving in formal student. *Journal of Physics: Conference Series*, *1657*(1). https://doi.org/10.1088/1742-6596/1657/1/012092

Widodo, S. A, Turmudi, T., & Dahlan, J. A. (2019). An Error Students In Mathematical Problems Solves Based On Cognitive Development. *International Journal Of Scientific & Technology Research*, *8*(07), 433–439.

Yaniawati, R. P. (2013). E-Learning to Improve Higher Order Thinking Skills (HOTS) of Students. *Journal of Education and Learning (EduLearn)*, *7*(2), 109. https://doi.org/10.11591/edulearn.v7i2.225

Youchu, H. (2016). A qualitative study on the development of pre-service teachers' mathematical knowledge for teaching in a history-based course. *Eurasia Journal of Mathematics, Science and Technology Education*, *12*(9), 2599–2616. https://doi.org/10.12973/eurasia.2016.1259a

The Effectiveness of Mathemat-ics Learning Based on Javanese Vegetable Salad Context to Im-proving Students' Higher Order Thinking Skills

ORIGINALITY REPORT

6%	7%	6%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

3%

★ mail.mjltm.org

Internet Source

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		