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Ethnomathematics-Based Contextual Learning with Interactive Media to Improve Mathematics Problem Solving

Fikri Aulia[1], Setia Putri Dianti[2], Wikan Budi Utami[2], Ibnu Sina[2]

[1]Postgraduate School of Curriculum Development, Universitas Pendidikan Indonesia, Indonesia
[2]Department of Mathematics Education, Universitas Pancasakti Tegal, Indonesia

Abstract: The aim of the research are determine different math problem solving skills and character of the love's local culture between the student who receives contextual learning based on ethnomathematics using media interactive as well as students who only use contextual learning. The population of this research is the eighth-grade students in SMPN 9 Tegal city. With the Cluster Random Sampling, get two classes were taken as the experimental group consist56 student into contextual learning based on ethnomathematics with interactive animation and two classes were taken as a control group consist 55 student that only used contextual learning. In the data collecting technique used documentations, tests, and questionnaires. In the analyzing of the data used ano-way manova test. The results of the study showed $\lambda_{calculated}$ = 0.7925 (λ_{table} = 0.9413). This value indicated that an average value of math problem solving ability and the average questionnaire value of the love in the local culture students experiment class better than the control class students. This result conclude that the ability to math problem solving skills and character of love's local culture between the experiment class and the control class there are differences.

Keywords: contextual learning, ethnomathematics, media interactive, mathematic problem solving.

Abstrak: *Tujuan dari penelitian ini adalah mengetahui perbedaan kemampuan pemecahan masalah matematika dan karakter cinta budaya lokal siswa yang diajar dengan pembelajaran kontekstual berbasis etnomatematika berbantuan animasi interaktif dengan siswa yang diajar hanya menggunakan pembelajaran kontekstual saja. Populasi pada penelitian adalah siswa kelas VIII SMPN 9 Kota Tegal. Dengan teknik cluster random sampling, diambil dua eksperimen kelas dan dua kelas kontrol, kelas eksperimen menggunakan pembelajaran kontekstual berbasis etnomatematika dengan animasi interaktif dan kelas kontrol dengan pembelajaran kontekstual saja. Teknik pengumpulan data menggunakan teknik tes dan teknik angket. Analisis data menggunakan tes Manova satu arah. Hasil penelitian menunjukkan bahwa λ_{hitung} = 0,7925 (λ_{tabel} = 0,9413). Nilai ini mengindikasikan bahwa rata-rata nilai kemampuan pemecahan masalah matematika dan rata-rata nilai angket cinta budaya lokal siswa kelas eksperimen lebih baik dari siswa kelas kontrol. Dapat ditafsirkan terdapat perbedaan kemampuan pemecahan masalah matematika dan kecintaan siswa terhadap budaya lokal yang diajar dengan pembelajaran kontekstual berbasis etnomatematka berbantuan Animasi interaktif dengan kelas yang diajar menggunakan pembelajaran kontekstual.*

Kata kunci: *pembelajaran kontekstual, etnomatematika, media interaktif, penyelesaian masalah matematika.*

Wikan Budi Utami
Email: wikan.piti@gmail.com

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▪ INTRODUCTION

Contextual learning has been applied in learning with contextual aspects in general and has not utilized the wealth of local culture in its learning. Student activity in learning will be very good if learning is also linked to local culture (Bazinet, 2015). Mathematics in culture is also called ethnomathematics (D'Ambrosio, 2001), ethno as all the elements that make up a group's cultural identity which includes language, code, values, jargon, beliefs, food and clothing, habits, and physical characteristics. A very important aspect of integrating cultural and folklore elements and values from the daily life and society of the students (Fouze, 2018). Therefore, needed learning to enhance problem solving with associate culture, one of them is contextual learning based on ethnomathematics with interactive animation.

Contextual learning is a learning concept that helps teachers relate between material that is appropriate to students' real-world situations and encourages students to make connections between their knowledge and their application in their lives (Trianto, 2014). Contextual learning is an attempt to make students active inpumping their own abilities without losing in terms of benefits because students also learn concepts while applying and connecting them to the real world (Surdin, 2018; Selvianiresa, 2017). Through contextual learning based on ethnomathematics, students can easier understand the material learned by applying it directly to the real situation passer-by culture.Elaine further said that contextual learning is a learning system that matches the brain that produces meaning and connects academic content to the context of students' daily lives (Rosa, 2017; David, 2007). Rusman (2015) illustrates that contextual learning is an attempt to make students active in pumping their own abilities without losing in terms of benefits because students also learn concepts while applying and connecting them to the real world. From the results of the observation that learning that occurs in class is still a lot of memorization. The learning done by the lecturers is not very desirable by students because of the lack of providing an interesting learning experience. Students hope that learning can motivate learning by connecting learning material to the actual problems that occur in their environment.

Mathematics in culture is also called ethnomathematics, ethno as all the elements that make up a group's cultural identity which includes language, code, values, jargon, beliefs, food and clothing, habits, and physical characteristics (Utami, 2019). Ethnomathematics is a study of mathematics that takes into account the culture in which mathematics arises by understanding the reasoning and mathematical systems they use. The study of mathematics associated with culture can help students understand the reasoning and the mathematical systems they use, as well as more familiar with cultural diversity. A study shows that problem solving skills are closely related to the love of cultural characters. The characters of love's cultural positively influence the work of students in math problem solving (Cahyaningrum, 2016).

The use of learning media and mathematical props will be very helpful in the effectiveness of learning. Based on research conducted by Utami, high-level thinking ability between classes taught using contextual learning with ethnomathematics using learning media and mathematics teaching aids better than classes that only use contextual learning (Utami, 2019). The median used in the study is interactive animations. With interactive animations, students can be more interested and better understand the concept of learning by associating the material in the real world that is through local culture.

The use of interactive animations with cultural associated and study of the love's local culture is the uniqueness of this research. With interactive animations, students can pay more attention to learning when taught and closer to culture. The issue of this research focuses on determining different math problem solving skills and character of the love in the local culture between the student who receives contextual learning based on ethnomathematics with interactive animation aids as well as students who only use contextual learning.

METHOD

The study was conducted with a quasi-experiment method. The research design used in this study was The Randomized Control Pretest-Posttest Design Group. The object of this research is the third-semester students, which consists of two classes into the control class and the experimental class. The material in this course is the basic concepts of set theory, probability, random variables, and their distribution, multivariate distribution, special distribution, and deep asymptotic mathematics.In the data collecting technique used documentations, tests, and questionnaires. In the analyzing of the data used ano-way manova test. Instruments used in the form of test instruments to measure the ability to math problem solving of students and questionnaire instruments to measure the character of love in the local culture of students. Data is obtained from the results of the test value and the questionnaire given to the student, which is then analyzed.

The research begins with giving lectures with the same material but with different treatments. The control class only given contextual learning is different from the experimental class which always applies ethnomatematics in contextual learning and also using interactive media. Playing some traditional game like snake and ladder game can be attributed to the material in the lecture on cube material study, so it is expected that in addition to students getting to know the play, students will also be able to master cube material study. The data analysis technique used is the one-way Manova test to know the difference in math problem solving skills and the love's local culture of students in the regional culture taught by contextual learning based on ethnomathematics with interactive animation aids are better than those taught only with contextual learning.

RESULT AND DISCUSSION

This research begins with teaching the same material that is the material to build the cube space and beam, but with different treatments.In the control class it is given contextual learning only, while in the experiment class is given contextual learning based on ethnomathematics with interactive animations.Interactive animations are shown related to culture. Culture is defined as all things related to culture (Wahyuni, 2013) including objects and food. So interactive animations contain the material in the image of culture in both traditional and cultural images, which relate to the material of building cubes and beams.Interactive animations are given to reinforce the concept of understanding and attract students' attention in mathematics learning.

In the control class is given modeling in the form of material-related objects but not traditional cultural or food objects, and does not use interactive animations in learning.In experimental classes, students are given direct modeling of traditional food and cultural objects related to teaching materials, so it is hoped that besides students to investigate the material of building cubes and beams, students also know about the

students' culture and love of local culture increased.After treatment, students are given a description and questionnaire test.

After tests of math problem solving skills in the experimental and control class, from 56 students gained 39 students with a value of 75 in the experimental class and from 55 students gained 32 students with a value of 75 in the control class.The value of math problem solving skills of students reaches 75 in experimental class reaches 70% and at the control reaches 58%. Based on field data, the experiment class obtained an average value of 82.05 while the control class had an average value of 76.48. For the value of the love in the local culture of the experiment class, it was obtained on average of 79.12. The control class obtains the average questionnaire value of 74.6182. The data processing capabilities of math problem solving and love in the local culture in the research that has been done, are display clearly in Figure 1.

It can be observed that the average experiment class obtained is higher than the average control class. It can be seen that high problem solving ability also affects the character of love in the local culture. In both classes, the differences in math problem solving skills are not much different from the characters of love in the local culture. The character of love in the local culture of the experiment class is higher compared to the control class where students' problem solving capability is also high. These two aspects are interconnected where the math problem solving skills are increasing, the love of local culture is also influential.

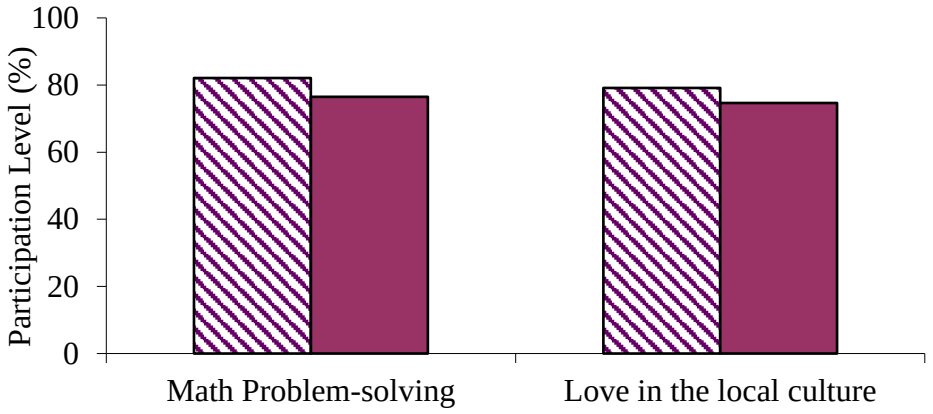

Figure 1. The average score of math problem solving and love in the local culture for experimental (diagonal-lined white) and control (red) class

The difference in the average score of math problem solving ability an experiment class and the control class was 5.5%. The difference in the average value of the experiment class and the control class is 2.5%. So it can be said the higher the solving ability of students, the higher the character of love culture students. The character of love in the local culture positively affects the student problem solving skills (Cahyaningrum, 2019). After the discussion of the data, analyzed using one-way Manova test to determine the difference in Math problem solving skills and the love of local culture among students given contextual learning-based ethnomathematics assisted Interactive animations with students who are given only contextual learning.Before the one-way test of Manova, data must be homogeneous and normal using multivariate normalcy tests and multivariate homogenization tests. Test the multivariate normality in the experiment class acquired Rq = 0.9828 and the control class obtained Rq = 0.9831

with R = 0.9652. From acquisition Rq in experiment class and control class then Rq> R, hypothesis received and normal multivariate data.

Then done test Manova one-way and obtained λcalculation = 0.7925 where λtable = 0.9509 so $\lambda_{calculation} < \lambda_{table}$ and H_0 rejected. It can be concluded that there are differences in math problem solving and students love the local culture between students taught with contextual learning based on ethnomathematics using interactive animation with students who are only to be taught with contextual learning.

From the above, it was found that the value of math problem solving capability in the experiment class was higher than the control class. Similarly, the character of love in the local culture of the experiment class students is higher compared to the control class. The contextual learning based on ethnomathematics using interactive animations is better compared to only contextual learning in improving math problem solving skills and students ' love of local culture. High-level thinking ability between classes taught using contextual learning with ethnomathematics using learning media and mathematics teaching aids better than classes that only use contextual learning (Utami, 2019). A research was acquired by the results that student misconceptions that follow interactive multimedia-assisted contextual learning outweigh the proportion of the misconception of students following conventional learning (Suniati, 2013). This is in line with the results gained in this study, contextual learning based on ethnomathematics with interactive animations is better compared to only contextual learning in improving solving ability math problem solving and a love of students on local culture. The use of learning media will also be very helpful in the effectiveness of learning (Widodo, 2018; Sainuddin & Taufiq, 2016). The media used in the study is internet-based learning, media. Internet-based learning media is a very effective learning media (Sarwar, 2018; Reyna, 2017; Yancey, 2017; Bidarra, 2015; Thomas, 2013) because every student can access learning material through his cellular telephone, it also raises various problems with the existence of local culture. One of the problems of cultural existence is the decline of love's local culture. The love's local culture is a manner of thinking, react, and efforts made by people to preserve the surrounding traditional culture, in accordance with the aspects of the love's local culture such as curiosity, socio-cultural conditions, appreciation for culture, and awareness in preserving culture.

CONCLUSION

Based on the results and the discussion above came the conclusion that there are differences in math problem solving skills and the character of love in the local cultural between students taught by contextual learning based on ethnomathematics using interactive animation with students who are taught only the contextual learning. This research is helpful in identifying the skills of math problem solving and students' love for local culture. It can be concluded that contextual learning based ethnomathematics with interactive animation can improve the ability to math problem solving and students' love for local culture.

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