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THE INFLUENCE OF THE APPLICATION OF ENGKLEK ETHNOMATHEMATICS ON MATHEMATICAL PROBLEM SOLVING ABILITY AT MADRASAH TSANAWIYAH NEGERI 6 JAMBI CITY

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ABSTRACT

This study aims to determine the effect of the application of engklek ethnomathematics on mathematical problem-solving abilities in Madrasah Tsanawiyah Negeri 6 Jambi City. This research is a quantitative study with a True experimental design, namely the Posttest-only control design. Class VII population of as many as 113 people. The sampling technique uses Simple Random Sampling. The sample size was drawn using two samples, namely the control group and the experimental group with a research sample of each group totaling 20 students. The data collection technique uses a description test totaling 5 questions. Data analysis in this study used t-test data analysis. From the results of the t-test calculation, it is obtained that t_0 is greater than t_table at a significance level of 5% or 1%, for a party test a significant level is 5% = 4,711 > 2.03 and a party test a significant level is 1% = 4,711 > 2.03. From the calculation results, the researchers found that the application of crank ethnomathematics had an effect on students' mathematical problem-solving abilities at MTs N 6 Jambi City. The results of this study suggest teachers be able to apply culture-based learning media in mathematics lessons.
Keywords: Engklek, Ethnomathematics, Mathematical Problem Solving.

Introduction

Mathematics learning objectives are linked to a person's ability to solve mathematical problems as stated in Minister of Education and Culture Regulation Number 22 of 2016. Based on the National Council of Teachers of Mathematics (NCTM), it also conveys the importance of problem solving in education.

A problem is something that must be solved or overcome, whether it is a difficulty in everyday life or a problem that must be solved. A question is said to contain a problem if a question is difficult to answer or solve. This ability is known as problem solving ability.

Linking mathematics education to the culture of the local community is one of the techniques for teaching mathematics in schools. The environment around children will have an impact on them as they grow and will also educate them. Apart from learning about the culture around them, children can work on or solve mathematical problems using various methods, not just using theories or formulas that are still abstract to them.

Remembering the meeting with a mathematics educator on November 4 2022 at Madrasah Tsanawiyah Negeri 6 Jambi City, currently mathematics learning in the classroom is not yet linked to traditional games, especially the engklek game, so students are still less familiar with the culture around them, especially

traditional games Nowadays it is increasingly rare for children to play traditional games(Fauziah et al., 2020).

If students are not introduced to the culture around them from an early age, students will become less fond of the existing culture. To introduce culture and make learning more interesting, interesting learning is needed, one of which is by linking mathematics learning material with the reality around students. Culture. in certain tribes or groups of people accompanied by the growth of mathematical activities is often known as ethnomathematics(Muslimahayati & Wardani, 2019).

Remembering that the first observation on October 12 2022 was carried out by researchers in class VII of Madrasah Tsanawiyah Negeri 6 Jambi City for the 2022/2023 academic year. Students are less dynamic in developing experience, students only write what the teacher says on the board without knowing the subject matter and fail to understand the questions. Students are only ready to work on the questions presented exactly with the questions that have been solved previously. If the questions are changed, students will start to get confused.

Researchers found that the majority of students found it difficult to master the questions, and only a few could answer them correctly. But the majority of students experience problem solving problems, this indicates that students still lack problem solving abilities.

Problems that arise in mathematics lessons or in everyday life must have solutions. By making connections between mathematics and students' culture or everyday life and by utilizing motivating learning strategies, teachers can develop problem-solving skills in their students(Asharianti & Yulia, 2021).

Children can solve difficulties by using the knowledge they have. Play activities can help solve math problems more effectively. The engklek game is one of the classic games that children continue to play today. The engklek game can help students strengthen their skills, particularly their capacity to solve mathematical problems, while ethnomathematics is being studied(Asharianti & Yulia, 2021). The engklek game is played on a field that reflects various flat shapes.

Students can arrange problem solutions from these questions either by using existing formulas or formulas they have by using flat shapes as icons in math problems by using flat shapes from the engklek game.(Muthmainnah et al., 2018).

There is a real correlation between advanced ethnomathematics and mathematical problem solving abilities. In fact, a number of studies have been carried out in the past, but most of the research is related to advanced ethnomathematics on mathematical problem solving abilities in MTs students. It seems that no one has conducted this kind of research. Therefore, it has become important to carry out this research. Based on the background discussed, researchers are interested in finding out the truth of this theory through research entitled the influence of the application of engklek ethnomathematics on mathematical problem solving abilities at MTs N 6, Jambi City.

Research Methods

The research method using a research design is defined as quantitative research that uses a true experiment strategy, more precisely a true experiment. There are two groups in this design and each is assigned randomly. The main group was given treatment (X), namely the experimental group and the control group which was not given treatment.

The target population for class VII is 113 people, because class VII A students' learning abilities are relatively high and their learning treatment is different from other classes, so in this research the target population is class VII B, C and D students with a total of 85 people.

The sampling method used is simple random sampling, namely collecting samples by determining sampling probability to give members of the population the same opportunity to be sampled by determining the lottery method.(Sugiyono, 2013, p. 82).

The sample size drawn in this study determined two samples, one control group and another group for the experimental group, the sample size for each group was 20 people (20. This sample was drawn as quoted by Roscoe's opinion in the book$\times 2 = 40$)(Sugiyono, 2013, p. 90)in point 4, for research that determines an experimental group and a control group, the number of sample members each ranges from 10 to 20.

Results And Discussion

In this research, the modification of engklek ethnomathematics takes the form of engklek patterns and game methodology. The crank pattern modified in this research consists of parallelogram, triangle, circle, square, rectangle, rhombus, trapezoid and circle. This design change is suitable for class VII triangular and rectangular materials.

Practice learning using engklek ethnomathematics, especially conventional engklek games played in groups. The teacher divides the class into 5 groups, each group consists of 4 students chosen at random. Students then organize their groups after the teacher explains about engklek media which consists of 7 fields with varying shapes. When students have learned a little about the crankshaft being studied, the teacher instructs them on how to play and the rules.

During the game process, students are given challenge questions and punishment questions, challenge questions in the form of square and rectangle questions, these questions are given before students proceed to the game field. Groups are deemed to have failed, cannot play further, and are subject to penalties if they are unable to provide complete and accurate answers to challenge questions. Meanwhile, those who fail and are unable to throw the stick directly onto the playing field will be subject to sanctions in the form of questions and prohibited from continuing the game.

Groups 4 and 5 are the winners, finishing the game in one round, and getting the house. Groups 1, 2, and 3 were unable to continue the game because they were unable to throw the pot correctly. As a result, they received punishment in the form of questions.

Students are required to complete problems in the form of problem solving on

each existing flat shape. To play engklek, participants must obey the rules that mandate solving a problem, so that students become accustomed to solving problems.

According to the findings of the examination that has been carried out, students' mathematical problem solving abilities can be explained as follows:

1. Subjects who have high mathematical problem solving abilities

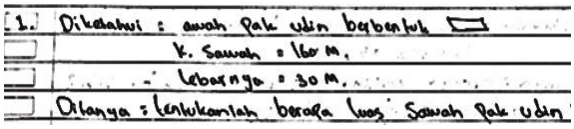

Figure 1

a. Understand the problem

From the answers in Figure 1 below, S1 writes down what is known about the problem by noting the length and width of the rectangular shape. Then S1 recorded the questions in writing.

b. Make a Plan

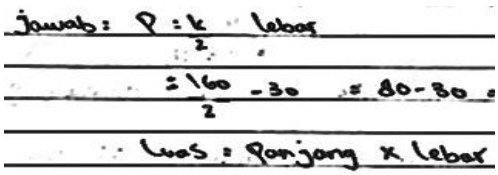

Figure 2

From the answers in the image above, S1 makes a plan to solve the problem and explains what is known about the problem. S1 decides to use the appropriate formula. He analyzed the formula after he understood what he knew and what was asked in the question. Then S1 designs solutions for each step that will be used. S1 specifies the square area formula to be used.

c. Implementing the Plan

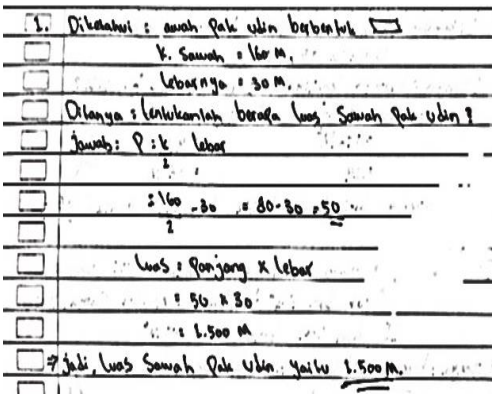

Figure 3

The next step in the answer in Figure 3 is for S1 to make plans and strategies that S1 will use to answer the questions in the problem. S1 can confirm that the formula used is the formula for the area of a rectangle. Before using the rectangle formula S1 find the length of the rectangle using the perimeter formula. S1 can complete plans systematically.

d. Check again

After completing the answer, the next stage is S1, checking the calculation results again that have been obtained. S1 checks each step that has been produced and reviews it again by writing down what is known about the problem until S1 makes a conclusion.

2. Subjects who have moderate mathematical problem solving abilities

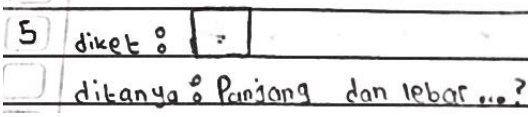

Figure 4

a. Understanding the Problem

From the answers in Figure 4, the results of problem solving for subjects who have moderate ability first read the questions. Then S2 wrote down what was known and what was asked but was not yet correct.

b. Develop a Resolution Plan

S2's answer is in Figure 4. After writing down what he knows and reading the question, S2 plans the formula he will use, namely the formula for the area of a square correctly.

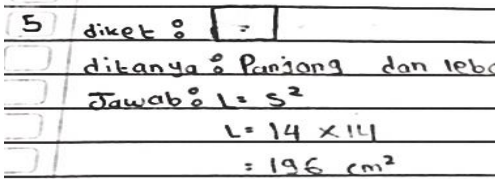

Figure 5

c. Implementing the Plan

From the answer in Figure 5, in carrying out S2's plan he used the formula he had planned but there was a slight error because S2 still had steps from S2's answer that were still wrong.

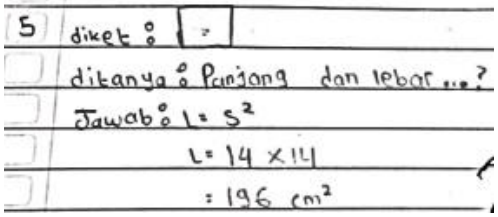

Figure 6

d. Check again

After receiving the final results obtained, S2 did not write the results back down.

3. Subjects who have low mathematical problem solving abilities

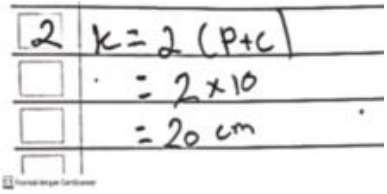

Figure 7

a. Understanding the Problem

From the results of working on the problem in Figure 7, the subject who has low problem solving ability, S3, did not write down what he knew from the problem.

b. Develop a Resolution Plan

From S3's answer in Figure 7, in the step of preparing a plan, S3 can decide which formula plan will be used for the problem at hand.

c. Implementing the Plan

In Figure 7, in implementing the plan S3 wrote down the plan that had been prepared unsystematically, in this step S3 was unable to solve the existing problems. S3 seemed careless in answering the questions.

d. Check again

In the step of checking the answers again, S3 did not repeat the answers he had already answered.

The "t" test equation can be used to measure the significance of differences. Before carrying out an investigation, it is necessary to use preliminary tests, especially normality tests and homogeneity tests. This test is intended to provide a response to the problem specifications as stated.

Table 1. Normality test results for control

class and experimental class

From table 1 above, it is found that the experimental class has and the control class has, so it can be concluded that the sample has a Normal distribution.$l_{hitung} < l_{tabel} l_{hitung} < l_{tabel}$

Table 2. Homogeneity test results for control class and experimental class

Largest variance	Smallest variance	f_{hitung}	f_{tabel}	Information
138.0921	12.3026	1,129102	2.17	Homogeneous

Table 2, shows$f_{hitung} =$ 1,129102 and so it can be concluded that the sample has a homogeneous distribution.$f_{tabel} =$ $2{,}17 f_{hitung} \leq f_{tabel}$

If the use of crank ethnomathematics is appropriate, it can be determined through parametric investigations using the "t" test equation.

The "t" test is used to test the hypothesisThe value obtained is; whereas and then at that point is more prominent than both at the significance level and at the 1% significance level. Thus the assumption of the null hypothesis is rejected, which means that students' mathematical problem solving abilities directed through the application of engklek ethnomathematics are superior to the problem-based learning model.$t_0 4{,}711377 t_t =$ $2{,}03\ 2{,}72 t_0 t_{tabel} 5\%$

The phi correlation approach is used to estimate how big the effect of applying engklek ethnomathematics is on students' mathematical problem solving abilities after carrying out a "t" test to understand whether there is a difference in the average level of mathematical problem solving. Can be found in the significance

Class	The number of students	l_{hitung}	l_{tabel}	Information
Experiment	20	0.177004	0.19	Normal
Control	20	0.124079	0.19	Normal

decree, while in the significance decree. obtained is greater than (namely: 0.304 and 0.3930) or the alternative hypothesis is accepted. This means that there is a significant influence between tests of mathematical problem solving abilities that apply engklek ethnomathematics.$r_{tabel} 5\% =$ $0{,}3041\% = 0{,}393\emptyset =$ $0{,}455\ r_{tabel} 0{,}304 < 0{,}405 > 0{,}393 H_a($

Conclusion

Based on the results and discussions that researchers conducted research at Madrasah Tsanawiyah Negeri 6 Jambi City, based on the research objective of the influence of the application of engklek ethnomathematics on students' abilities in solving mathematical problems.

1. With an average of 64.75, the problem solving abilities of students who use ethnomathematics outperform the problem solving abilities of students who use the student problem-based learning model.
2. The average value of the mathematical problem solving ability of class VII students at MTs N 6 Jambi City who do not use engklek ethnomathematics but use a problem-based learning paradigm is 47.75.
3. There is a big difference basically

between the experimental group and the control group with the "t" test in particular this value is higher than and can be written. $t_{hitung} = 4{,}711377 t_{tabel}\ 5\% = 2{,}03 t_{tabel}\ 1\% = 2{,}722{,}03 < 4{,}711 > 2{,}72$

4. The size of the influence of the application of engklek ethnomathematics on students' mathematical problem solving abilities is obtained by calculating the pi correlation, namely the value is higher than and can be written. Because it is rejected, it shows that there is a significant difference between the scores of the experimental and control groups on mathematical problem solving abilities. $\varphi = 0{,}405 r_{tabel} 5\% = 0{,}304 r_{tabel} 1\% = 0{,}3930{,}304 < 0{,}405 > 0{,}393 \varphi > r_{tabel} H_0$

References

Anggita, G. M., Mukarromah, S. B., & Ali, M. A. (2018). Eksistensi Permainan Tradisional Sebagai Warisan Budaya Bangsa. *Journal of Sport Science and Education (JOSSAE)*, *3*, 2548–4699.

Anggraeni, S. T., Muryaningsih, S., & Ernawati, A. (2020). Analisis Faktor Penyebab Kesulitan Belajar Matematika Di Sekolah Dasar. *JRPD (Jurnal Riset Pendidikan Dasar)*, *1*, 25–37.

Aprilia, E. D., Dinawati, T., & Setiawan, T. B. (2019). Etnomatematika Pada Permainan Tradisional Engklek Beserta Alatnya Sebagai Bahan Ajar. *Kadikma*, *10*.

Arista, L. O., Handayanto, A., & Damayanti, A. T. (2018). Efektivitas Model Pembelajaran Numbered-Head Together Berbantu Media Permainan Tradisional Engklek Terhadap Hasil Belajar Matematika Kelas III SDN Bendungan Semarang. *JGK (Jurnal Guru Kita)*, *2*(3), 47–56.

Asfar, A. . I. T., & Nur, S. (2018). *Model Pembelajaran PPS (Problem Posing & Solving)* (H. Wijayanti (ed.); 1st ed.). CV Jejak.

Asharianti, T., & Yulia, E. R. (2021). *Efektivitas Etnomatematika Permainan Engklek terhadap Kemampuan Pemecahan Masalah Matematis Siswa*. 53–61.

Damayanti, R., & Afriansyah, E. A. (2018). Perbandingan Kemampuan Representasi Matematis Siswa antara Contextual Teaching and Learning dan Problem Based Learning. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, *7*, 30–39.

Fauziah, A., Erawati, E., & Annisa, C. (2020). Engklek Gen 4.0 (Studi Etnomatematika: Permainan Tradisional Engklek Sebagai Media Pembelajaran Matematika). *Factor M: Focus Action Of Research Mathematic*, *3*, 33–48.

Fitriyah, A., & Khaerunisa, I. (2018). Pengaruh Penggunaan Metode Drill Berbantuan Permainan Engklek Termodifikasi terhadap Kemampuan Pemecahan Masalah Siswa Kelas VII. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, *2*(2), 267. https://doi.org/10.31331/medives.v2i2.653

Jainuri, M. (2019). Kemampuan

Pemecahan Masalah Matematika. *Acamedia*, *1*(1), 1–8.

Kusaeri, A. (2019). *PENGEMBANGAN PROGRAM PEMBELAJARAN MATEMATIKA* (1st ed.). Kristayulita.

Mauleto, K. (2019). Analisis Kemampuan Pemecahan Masalah Ditinjau Dari Indikator Nctm Dan Aspek Berpikir Kritis Matematis Siswa Di Kelas 7b Smp Kanisiu Kalasan. *Jurnal Ilmiah Pendidikan Matematika*, *4*, 125–134.

Muhartini, Mansur, A., & Bakar, A. (2023). Pembelajaran Kontekstual Dan Pembelajaran Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, *1*, 66–77.

Muslimahayati, M., & Wardani, A. K. (2019). Implementasi Etnomatematika Masyarakat Suku Anak Dalam (SAD) Kabupaten Batanghari Provinsi Jambi pada Pembelajaran Matematika. *Jurnal Elemen*, *5*(2), 108. https://doi.org/10.29408/jel.v5i2.957

Muthmainnah, H. T., Mufti, F. N., Tita, E., & Hidayati, Y. M. (2018). *The 8 th University Research Colloquium 2018 Universitas Muhammadiyah Purwokerto* Metode Permainan Tradisional Engklek Pada Pembelajaran Engklek Traditional Game Methods On Two-Dimentional Figure Learning. *The 8 th University Research Colloquium 2018 Universitas Muhammadiyah Purwokerto*. 189–195.

Nasryah, C. E., & Rahman, A. A. (2020). Pengaruh Pendekatan Etnomatematika Terhadap Kemampuan Pemecahan Masalah Matematis Dan Motivasi Siswa Sd Di Aceh Barat. *MAJU: Jurnal Ilmiah Pendidikan ...*, *7*(2), 126–140.

Nuriyati, & Supriadi. (2022). Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa Sekolah Dasar melalui Pembelajaran Etnomatematika Sunda dengan Media Congklak. *Jurnal Pendidikan Tambusai*, *6*(2), 15473–15481.

Purnamasari, I., & Setiawan, W. (2019). Analisis Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi SPLDV Ditinjau dari Kemampuan Awal Matematika. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, *3*(2), 207. https://doi.org/10.31331/medivesveteran.v3i2.771

Qusthalani, Alfiatun, Nurmalawati, Mukhlisah, Yusnidar, Muhammad, Muliyani, Riadhul, Marhamah, Zainiah, Maulianti, & Fitriani. (2022). *Menghambakan Diri Pada Anak* (Qusthalani (ed.); 1st ed.). CV Jejak, Anggota IKAPI.

Rahma, P., & Hidayati Nita. (2022). Kemampuan Pemecahan Masalah Matematis Siswa Kelas XI SMK Berdasarkan Tahapan Polya. *Educatio*, *8*, 256–263. https://doi.org/10.31949/educatio.v8i1.1978

Rahman, A. A., & Nasryah, C. E. (2019). *EVALUASI PEMBELAJARAN* (1st ed.). Uwais Inspirasi Indonesia.

Rahmatal, K., Aniswita, & Pipit, F. (2019). Kemampuan Pemecahan Masalah Matematika Siswa Menggunakan Model Pembeajaran Search Solve Create and Share Di Kelas VIII Putri Pondok Pesantren Modern Diniyyah Pasia. *Juring (Journal for Research*

in Mathematics Learning, *2*, 265–272.

Siahaan, J. H., Sihombing, S., & Simamora, B. A. (2022). Studi Komparasi Kemampuan Berpikir Kritis Siswa Dengan Menggunakan Model Pembelajaran Konvensional Pada Mata Pelajaran Ips Terpadu Kelas VIII Di SMP Negeri 10 Pematangsiantar T.A 2022/2023. *Cendikia: Media Jurnal Ilmiah Pendidikan*, *13*, 188–195.

Sudijono, P. D. A. (2019). *Pengantar Statistik Pendidikan*. PT RajaGrafindo Persada.

Sugiyono. (2013). *Metode Penelitian Kuantitatif Kualitatif Dan R&D* (19th ed.). ALFABETA.

Sururiyah. (2019). *Ayo Lestarikan Permainan Tradisional Indonesia* (1st ed.). PT Mediantara Semesta.

Syaripuddin. (2019). Pemanfaatan Etnomatematika Permainan Engklek Dalam Pembelajaran Matematika. *MathEducation Nusantara*, *2*.

Thamsir, T., Silalahi, D. W., & Soesanto, R. H. (2019). Upaya Meningkatkan Kemampuan Pemecahan Masalah Soal Non-Rutin pada Materi Persamaan dan Pertidaksamaan Linear Satu Variabel dengan Penerapan Metode Peer Tutoring. *JOHME: Journal of Holistic Mathematics Education*, *3*(1), 96–107.

Wulansuci, R. A., Restian, A., Iza, M., Eromoko, K., & Wonogiri, K. (2021). Peningkatan Kemampuan Pemecahan Masalah Kontekstual Materi IPA Melalui Penggunaan Model Problem Based Learning. *Jurnal Pendidikan Profesi Guru*, 76–82.

Zaenuri, & Dwidayati, N. (2018). Menggali Etnomatematika: Matematika sebagai Produk Budaya. *PRISMA 1*, 472–476.