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STUDENTS' MATHEMATICAL CRITICAL THINKING ABILITY IN PROBLEM-BASED LEARNING ASSISTED WITH INTERACTIVE MEDIA WITH ETHNOMATHEMATIC NUANCES

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ABSTRACT

Indonesian students' critical thinking ability is still low. The lack of critical thinking skills occurs because students tend to memorize material and formulas rather than understand concepts, so that students are less trained in developing critical thinking skills.QThe aims of this study were (1) to find out the effectiveness of the problem-based learning model assisted by interactive media with ethnomathematics nuances on the mathematical critical thinking skills of Grade VIII students of SMP Negeri 1 Adiwerna. The population in this study were students of class VIII SMP Negeri 1 Adiwerna Tegal Regency for the academic year 2021/2022 consisting of 9 classes. The sample in this study was class 8I as an experimental class that was given learning using a problem-based learning model assisted by interactive media, class 8F as a control class that was given expository model learning and class 8A as a trial class. The research method used in this research is Quasi Experiment with Nonequivalent Control Group Design. In this design, there are two groups selected by cluster random sampling. The research procedure consisted of four stages, namely the planning stage, the implementation stage, the data analysis stage and the conclusion drawing stage. Data collection techniques in this study include documentation, questionnaires, and tests. Data analysis techniques in this study were individual completeness tests, classical completeness tests, average similarity tests. The results of this study are (1) the problem based learning model assisted by interactive media with ethnomathematics nuances is effective for mathematical critical thinking skills,

Keywords: Mathematical Critical Thinking Ability, Problem Based Learning Model Assisted by Interactive Media with Ethnomatematics Nuances.

INTRODUCTION

The 2018 Program for International Student Assessment (PISA) study results place Indonesia in the 7th lowest rank among 78 other countries in the Mathematics category(OECD, 2019). Indonesia's low ranking in the PISA mathematics category indicates that students' critical thinking skills are still low (Lestari et al., 2019). This is in accordance with the research of Nuryanti et al (2018), it was found that the critical thinking skills of Delangu Klaten Middle School students were still low. Research conducted by Nurazizah & Nurjaman (2018) also produces the same, namely the ability to think critically mathematically students are still relatively low.

Not used to being given active learning (Nuryanti et al., 2018), and students' lack of understanding of concepts (Nurazizah & Nurjaman, 2018) be the cause of the lack of students' critical thinking skills. There is also a lack of critical thinking skills in SMP Negeri 1 Adiwerna. There are some students have difficulty in working on problems that require students to analyze and manipulate to solve them.

Critical thinking is a tool for solving problems by reasoning, interpreting, analyzing and evaluating so that valid decisions are obtained (Chukwuyenum, 2013). Students' critical thinking skills can be improved with the Problem Based Learning model.This is in line with Seibert's research (2021), namely critical thinking skills can be improved with PBL.

Mathematics learning is more meaningful if the problems used are related to the culture (Amalia & Widodo, 2018). Therefore, the learning materials used are related to culture. According to D'Ambrosio (in Haryanto et al., 2015) Mathematics used by a group of people in their culture is called ethnomathematics.

Learning with computers is more effective and efficient and is greatly enjoyed by students (Utama et al., 2012). Therefore, the use of the PBL model can be maximized with the help of computer-based learning media. One of the computer programs that can be used is PowerPoint, Adobe Flash, and many more. With flash software an animation can be made (Utama et al., 2012). Animation can illustrate a number of concepts that help students

understand abstract concepts (Fatahullah, 2016). In addition, the use of adobeflash is also effective for students' mathematical critical thinking skills (Kusumadewi et al., 2013)

Based on the description above, it is necessary to conduct research with the title "Analysis of students' mathematical critical thinking skills in the problem-based learning model assisted by interactive media with ethnomathematics nuances". The purpose of this research are: (1) to find outthe effectiveness of the problem-based learning model assisted by interactive media with ethnomathematics nuances on the mathematical critical thinking skills of class VIII students of SMP Negeri 1 Adiwerna.

RESEARCH METHODS

This research is a quasi-experimental research on students in a class. The experimental design used was the Nonequivalent control group design. This design uses two groups, namely the experimental and control groups, each group is given a different treatment. The experimental group was treated with the application of PBL assisted by interactive media with ethnomathematics nuances and the control group with expo-itori learning.

The research procedure consisted of four stages, namely the planning stage, the implementation stage, the data analysis stage and the conclusion drawing stage. The independent variable in this study is a problem-based learning model assisted by interactive media, while the dependent variable is critical thinking skills.

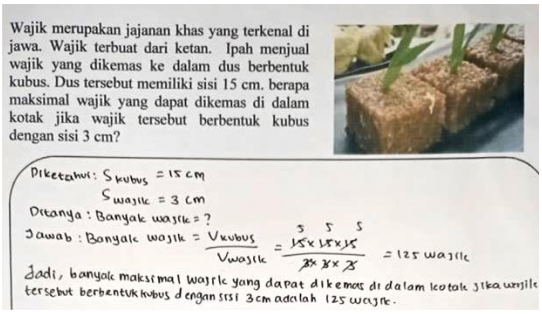
The population in this study were class VIII students at SMP Negeri 1 Adiwerna Tegal Regency for the 2021/2022 academic year consisting of 9 classes. Three classes were selected as samples, namely class 8I as the experimental class which was given learning using a problem-based learning model assisted by interactive media, class 8F as the control class which was given expository model learning and class 8A which was used as a trial class for testing students' mathematical critical thinking skills. Data collection techniques in this study included quantitative data collection techniques, namely tests, questionnaires, documentation and observation.

Analysis of the test items in this study were validity, reliability, difficulty index and discriminatory power. quantitative data analysis, namely individual adequacy test, classical adequacy test,

RESEARCH RESULTS AND DISCUSSION

An initial ability test is given before problem-based learning is assisted by interactive media with ethnomathematics nuances. Based on the initial test data for students' mathematical critical thinking skills, the normality test, homogeneity test and average similarity test were carried out. The results of the initial tests stated that the class came from a normally distributed population, the control and experimental classes had homogeneous variances, andstudents' initial critical thinking skills under the same conditions.

The final ability test is given after the problem-based learning is carried out with the help of interactive media with ethnomathematics nuances. The following is one of the results of the final mathematical critical thinking ability test.


Wajik merupakan jajanan khas yang terkenal di jawa. Wajik terbuat dari ketan. Ipah menjual wajik yang dikemas ke dalam dus berbentuk kubus. Dus tersebut memiliki sisi 15 cm. berapa maksimal wajik yang dapat dikemas di dalam kotak jika wajik tersebut berbentuk kubus dengan sisi 3 cm?

Diketahui: $S_{kubus} = 15$ cm
$S_{wajik} = 3$ cm
Ditanya : Banyak wajik = ?
Jawab : Banyak wajik = $\frac{V_{kubus}}{V_{wajik}} = \frac{15 \times 15 \times 15}{3 \times 3 \times 3} = 125$ wajik
Jadi, banyak maksimal wajik yang dapat dikemas di dalam kotak jika wajik tersebut berbentuk kubus dengan sisi 3 cm adalah 125 wajik.

Figure 1. Final Mathematical Critical Thinking Ability Test

Figure 1 is one of the final critical thinking skills tests with inference indicators. Then homogeneity test, normality test, individual completeness test, classical completeness test, and average difference test on students' final mathematical critical thinking ability scores. The results of the normality test resulted in the data coming from a normally distributed population, and the results of the homogeneity test resulted in the experimental and control classes having a homogeneous variance.

Individual completeness test results obtained t count 2.097, with α = 0.05 obtained = 1.699. Then , then H0 is rejected and it can be concluded that the average $t_{tabel} = t_{30-1,0,05}\ t\ hitung = 2{,}097 >$ t_{tabel} the final critical thinking test results for students who were taught

using the problem-based learning model assisted by interactive media with ethnomathematics nuances exceeded 71.50.

The results of the calculation of the classical completeness test obtained z count = 1.897, with α = 0.05 obtained = = 1.64. Z count, then H0 is rejected and it can be concluded that $z_{\text{tabel}} = z_{0,5-0,05} z_{0,45} = 1{,}897 > z_{\text{tabel}}$ the proportion of students who are taught using the problem-based learning model assisted by interactive media with ethnomathematics nuances those who achieve completeness of the critical thinking ability test scores have exceeded 75%.

Based on the results of the individual and classical mastery tests, the critical thinking skills of students who received problem-based learning assisted by interactive media with ethnomathematics nuances were obtained to achieve individual and classical mastery. These results are in accordance with the research of Linda et al (2019), the result is that students' critical thinking skills achieve individual and classical mastery in learning with the PBL and Guide Inquiry models. In addition, research from Wahyu et al (2020) has the same result, that is, the average students' mathematical critical thinking skills in the problem-based learning model and the pair and check model achieve both individual and classical mastery.According to Rizal et al (2017), the learning model factor used by the teacher has a significant effect on students' critical thinking skills.

The results of the average similarity test at the end of the students' mathematical critical thinking skills were obtainedt count = 1.971, with degrees of freedom for the t distribution is (n-1) = 29, with α = 5% obtained t_((0.95)(29))= 1.699. Because 1.971 > 1.699 then H0 is rejected. Which meanthe average final critical thinking ability of students taught using the problem-based learning model assisted by interactive media with ethnomathematics nuances is more than the class taught using the expository model. These results are in accordance with research from Rofiq(2019), resulted that the critical thinking skills of students who were taught by the problem based learning model were better than the critical thinking abilities of students who were

taught by the expository model. Based on the test results, it can be concluded that the problem based learning model assisted by interactive media with ethnomathematics nuances on the ability to think critically mathematically.

CONCLUSION

Based on the results of the research and discussion, it is concluded that learning using problem-based learning models assisted by interactive media with ethnomathematics nuances is effective for junior high school students' mathematical critical thinking skills. This is demonstrated by the ability to think critically in classes taught by problem-based learning models assisted by interactive media with ethnomathematics nuancesachieving individual and classical mastery and on average better than students' mathematical critical thinking skills in expository learning.

SUGGESTION

Based on the results of the research conducted, the following are suggestions that need attention, including: 1) Mathematics teachers should choose a learning model that always involves students to be active during learning activities so that students' thinking potential can be maximized. 2) students should not only memorize formulas but also understand the concepts contained in a material.

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