

Creative Thinking Ability in Habits of Mind-based Ethnomathematics JUCAMA Learning Models

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Abstract

The Problem Submission and Solving (JUCAMA) learning model is a learning model that is oriented towards problem submission and solving to improve students' creative thinking skills. The purpose of this study is to determine the effectiveness of ethnomathematics JUCAMA learning models and to determine the influence of the mathematical habits of mind on the creative thinking ability of students. The research method used for this research is a mixed-method using a sequential explanatory design. The population in this study were students of class VIII in Junior High School of State at Sub-District Donggo Regency of Bima which is not a One-stop Middle School and the sample is class VIII of Junior High School of State 3 Donggo. Class VIII/A is the control class and class VIII/B is the experimental class. The results was showed that the average creative thinking ability of students taught by using etnomathematics JUCAMA learning model more higher than the average thinking ability of students taught by problem-based learning. Students who are taught with the ethnomathematical JUCAMA learning model experience an increase in creative thinking skills in the medium category, while students who are taught with problem-solving learning models experience an increase in creative thinking skills in the low category based on the N-gain category. In improving the creative thinking ability, the ethnomathematics JUCAMA learning models were applied to the experimental class more effective than problem-solving learning models were applied to the control class. There is the influence of the mathematical habits of mind on the creative thinking ability of students.

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INTRODUCTION

The general purpose of giving mathematics at the primary and secondary education levels is to prepare students to be able to use mathematics and mathematical thinking patterns in everyday life and learning various sciences (Maftukhah, Nurhalim, & Isnarto, 2017). In mathematics, creative thinking ability is necessary for learning mathematics because the learning of mathematics should emphasize creativity (Arifin, Suyitno, & Dewi (Nino Adhi), 2020). Following the objectives of the 2013 curriculum, then it is a fitting process of learning mathematics that is not only focused on cognitive knowledge but the development of knowledge effective as the attitude of mathematics. The most important thing to remember that a positive attitude towards mathematics positively correlated with learning achievement of mathematics. Moreover, the learning process following the 2013 curriculum should touch the three domains of competence that are attitudes, knowledge, and skills (Suzana, 2017).

A survey conducted by the program for international student assessment (PISA) study in 2018, this rate of 600,000 15-year-old boys from 79 countries every three years. this study compares the ability of math, reading, and the performance of the science of every child. Indonesia is in a position to 74 of the 79 countries that follow the test Pisa, for the category of math, Indonesia is ranked 7 out of the bottom, which means being in the position to 73 with an average score of 379. Indonesia is at the top of Saudi Arabia, which has an average score of 373. Then to rank one, still occupied china with an average score of 591 (Tohir, 2019). So the ability of mathematics needs to be directed following the vision of mathematics one is to train the ability to think creatively.

The creative thinking ability of the students can not develop well if, in the process of learning the teacher is not actively involves students in the formation of concepts, teaching methods used in schools are still conventional, that learning is still teacher-centered

(Fitrianawati & Hartono, 2016). Mathematical creative thinking ability is the ability to find solutions for the problems of mathematical easy and flexibly (Tandiseru, 2015). Creative thinking ability on the learning of mathematics is the ability for students to find the solutions or ideas that are diverse in solving mathematical problems (Sari, 2016). One of the affective components of the ability to think creatively is the habits of mind. The habit of thinking makes the intuition of mathematics informed thus provide a source of power to be thinkers better at math (Gordon, 2015). The number of learners on the level of education perceive mathematics as a difficult subject and often give rise to a variety of complicated problems to be solved, so the impact on the low learning outcomes of students (Saironi & Sukestiyarno, 2017). So in the process of learning the habit of mind of students must be considered to see how the creativity of students in solving mathematical problems.

The results of the answers students of class VIII SMP Negeri 3 Donggo to the given problem, shows that the student's difficulties in solving the given problem and to obtain the average value of 62, which is under the value of KKM that is 64. This shows that the creativity of students is still lacking in solving the given problem. The teacher should apply the approaches, strategies, and models of learning that keep students engaged in learning mentally, physically, and socially so that the ability of students can be developed and the learning objectives that have been planned can be achieved. The importance ask questions in the implementation of learning is supported by the PERDIKNAS number 41 the year 2007 about the standard process which states that in the introduction the teacher asks questions that link prior knowledge with material that will be studied.

JUCAMA learning models is a model of new learning which was introduced by Siswono to improve the ability of creative thinking of students (Karim & Normaya, 2015). In addition, the results of the research show that the application of the models JUCAMA can

improve the creative thinking ability of the learners (Fajrizal, Farida, & Fadila, 2019).

Learning that instills the values of the culture of Indonesia is required to improve the taste of the love of the homeland of the students. Mathematics is one lesson that can be pasted values of the culture in Indonesia. Applications of mathematics learning from some of the math concepts can be attributed to everyday life that is associated with the culture (Kusuma & Sapto, 2018). During this time students learn math using problems that do not fit with everyday life so that they feel difficulty understanding the concepts of math (Abdullah, Mastur, & Sutarto, 2015). When solving problems, students help each other to build math concepts and understand more about step problem solving through creative activities and problems use is a problem in real life (Li & He, 2018). The idea of ethnomathematics shows that the essential features of mathematics have been caused by the cultural background and the history of a community and that there are many types of different math with the practices of the particular cultural and historical context of the context of practice (Ju, Moon, & Song, 2016). Understanding math students learn the material-oriented ethnomathematics higher than learning the material-oriented non-ethnomathematics and understanding of students mathematical learning-oriented ethnomathematics material is low compared with the students learning the material non-ethnomathematics (Widada, Herawaty, & Lubis, 2018).

Based on the description of the background, then the research will be carried out a deep study on the creative thinking ability of students in the ethnomathematics JUCAMA learning. The formulation of the problem of this research is the effectiveness of ethnomathematics JUCAMA learning of creative thinking ability and there is the influence of the habits of mind of creative thinking ability of students. While the purpose of this study was to determine the effectiveness of the ethnomathematics JUCAMA learning models and to determine the influence of the

habits of mind mathematical of creative thinking ability of students.

METHODS

The research's mixed method design is a sequential explanatory design. One experimental class and one control class were used in the quantitative research design. The two groups are chosen in a randomly. The control group pretest-posttest was used as the quantitative research desing.

The qualitative research design used grounded theory's design. Research done in the Rasa Mbou, Village Padende, Subdistrict of Donggo, District of Bima, Province west of southeast and was held on the 11th of January till 27th January 2020 at Junior High School of State 3 Donggo. The population in this research was the students of class VIII Junior High School of State on Donggo Sub-District Regency of Bima which is not a One-stop Middle School. The sample in this study were students of class VIII Junior High School of State 3 Donggo class VIII class VIII/A as the control class taught using learning PBL and class VIII/B as the experimental class taught using ethnomathematics JUCAMA learning models.

RESULTS AND DISCUSSION

The purpose of this study is to determine the effectiveness of creative thinking ability through ethnomathematics JUCAMA learning and knew the influence of the habits of mind of creative thinking ability. The effectiveness of learning in this study can be seen from 1) The ability of creative thinking of students who are taught with the ethnomathematics JUCAMA learning reach the limit of the classical completeness, 2) The average ability of creative thinking of students in the class who were taught by using ethnomathematics JUCAMA learning more of KKM, 3) There is an average difference of creative thinking skills of students who are taught with the ethnomathematics JUCAMA learning with students who are taught with the learning of problem-based learning, and 4) An

increase in the ability of creative thinking of students is based on habits of mind in ethnomathematics JUCAMA learning. Based on the preliminary test of creative thinking ability of students performed a normality test, homogenates, and different test average of the second class. The results of the average difference of the preliminary data for the two classes obtained $t_{count}=5.11$ and $t_{table}= 1.68$ to. This shows that the average ability of mathematical creative thinking beginning of the students differs significantly.

The results show that the average ability of creative thinking of students who are taught with the ethnomathematics JUCAMA learning is 74.95. These values exceed the criteria limit the completeness of the actual obtained from the calculation of the initial test of the ability of creative thinking that is 64. Second, the learning in the class that is taught by ethnomathematics JUCAMA learning can assist students who have surpassed the level of complete in actual classical with students who have learned more than 75% of the subject. This is consistent with prior research findings, based on the research results of previous research show that the value of creative thinking skills to achieve mastery of more than 75%, the ability to think creatively with the model CORE is better than with the model expository, and there is a positive influence of emotional intelligence on the ability of creative thinking of 80.2% (Maftukhah et al., 2017). The model of learning with project-based learning nuanced ethnomathematics effective against problem-solving ability (Prabawa & Zaenuri, 2017). The results of other studies showed that from the results of the pretest students tend to be quite critical, while after the implementation of the learning model with the filing and students problem-solving tend to be critical with the percentage increased by 55.56% of these respondents (Rohmatin, 2014). While the results of another study also showed that the

application of the model JUCAMA can improve the creative thinking skills of the learners (Fajrizal et al., 2019) and the result other studies also showed that the critical thinking skills which are achieved by the student overall at the high category with a model of learning JUCAMA (Karim & Normaya, 2015).

Third, the average ability of creative thinking of students in classes taught with the ethnomathematics JUCAMA learning is better than in the average ability of creative thinking of students who are taught with the model problem-based learning. The thing is in line with the results of the study previously showed that there are strong relationships between critical thinking skills with the student's response to the model JUCAMA (Karim & Normaya, 2015). The difference in previous research with this research is on the research that is seen is the ability of creative thinking of students who taught by JUCAMA learning models associated with the culture that exists around the students of the model learning the nuances of ethnomathematics.

Fourth, grade students taught with the ethnomathematics JUCAMA learning models experience that the increase was not significant. It can be seen from the average test n-gain graders experiment was 0.31 which means is in the medium category were based on the criteria of n-gain. Then the ethnomathematics JUCAMA learning can improve the creative thinking skills of students. This is in line with the results of previous research which found that there is an increase in the value of creative thinking abilities of students who are taught learning SSCS-assisted media puzzle material fractions (Herayani, Kartono, & sukestiyarno, 2015). Test n-gain is used to see an increase in the ability of creative thinking of students. The increase in the ability of creative thinking of students can be seen in result exam gain experimental class students in Figure 1 below.

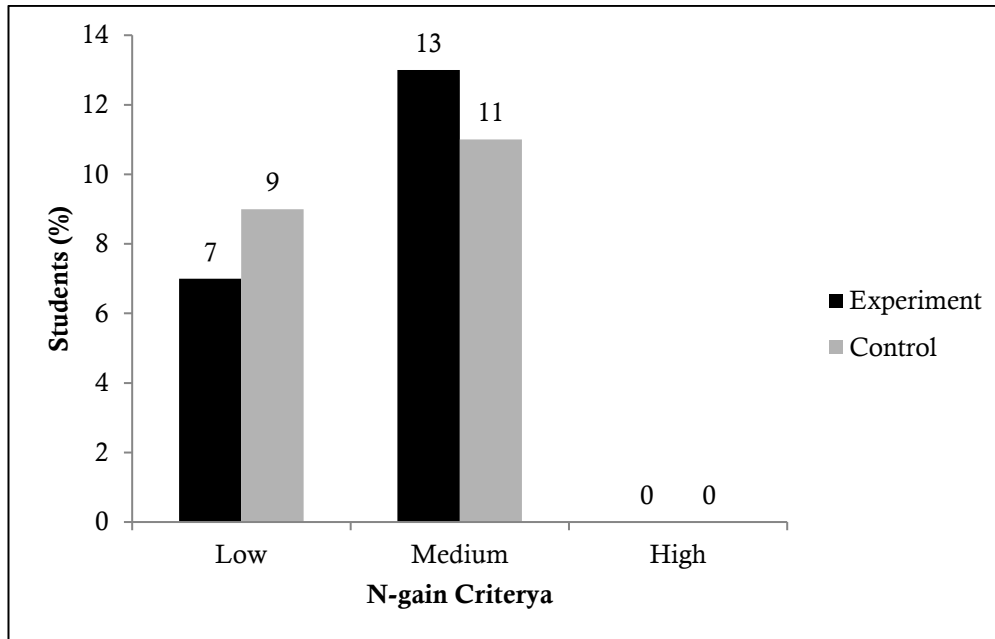


Figure 1. Test N-Gain

Based on Figure 1 it is shown that explained that in the experimental class, 7 students were included on the criterion of n-gain in the category of low, 13 students that are included in the criteria of n-gain in the medium category, and some students are included in the criterion of n-gain in the high category. It means to increase the ability of creative thinking of students on a class of experiments that taught with the ethnomathematics JUCAMA learning in the medium category. This is in line with what was found by other researchers that the model pembelajaran treffinger with the approach of open-ended can improve the ability of mathematical creative thinking class VII with the gain of 0.47 criteria of medium (Triwibowo, Dwidayati, & Sugiman, 2017). In another study also found that the ability of creative thinking of students increased by the gain of 0.4 and included in the medium category (Asikin, Prastiyo, & Suhito, 2019). The results of another study showed that the results of the assessment of self-regulation show the value of n-gain of 0.59 is in the category of being that is said to increase in value between the results of the pretest with the value of the posttest (Nurhadi, Hizqiyah, & Saraswati, 2019). So the use of

ethnomathematics JUCAMA learning model can improve the creative thinking ability of students. This is in line with the results of the study show that the ability of creative thinking of students using the approach of the PMR at the high category with the details of each indicator, that is the health indicator is in the category of high, flexibility is in the category of being, and the originality is in the category of low (Fajriah & Asiskawati, 2015).

The effectiveness in the learning process is one of the indicators of achievement the success of the learning process in the classroom. The success of the learning in the class is also determined by how a teacher can make innovation a change in the polishing of the learning process with how to modify the model of learning in the classroom can increase the motivation and creativity of the students. ethnomathematics JUCAMA learning based on the local culture, make students more active and creative during the learning process. In the process of learning, students can recognize the cultural surrounding, so that the students realize that mathematics is not independent in everyday life.

The process of learning applied is ethnomathematics JUCAMA learning models following the theory of learning constructivism. According to Gagne that learning is an activity

to form what is in themselves good students in developing and modifying the acquired knowledge, skills, attitudes, habits, and hobbies are the deepest in the person. Activity in the learning process resulted in a change in behavior as a result of the learning process that passed. The ethnomathematics JUCAMA learning students form groups to discuss. Discussion is one of the activities that engage your students and help students to construct knowledge themselves with how to find concepts, investigate the object directly, and resolve the problem.

The process of the implementation of ethnomathematics JUCAMA learning models includes preliminary activities, core activities, and closing activities. Activity introduction includes activities that support students on the attitude of the religious and the attitude of discipline that is prayer and presence, apperception, motivation, deliver learning objectives, and an overview of the material benefits of linear equations two variables associated cultures that exist around the students. There is a core activity, students observe the material and experiences provided by the teacher that there are in teaching materials that the material in it is associated with the culture that is around. This stage is one of the stimuli to train students to think creatively. After that, the students are given problems of linear equations two variables that are associated with cultures that exist around the student and following the existing measures on the activity student sheet. The problems contained in the student worksheets be solved in the form of a group and discussed with your class.

The results of the discussion of each group are demonstrated by representatives of each group member in turn, and the other group responds to the results that are being presented and teachers help students who are experiencing difficulty during the process of the discussion. These activities can encourage students to be more active in the learning, closing activities teacher evaluation of the learning process and give the students a job home contained in the materials. Ethnomathematics JUCAMA

learning models has the same pattern in every activity. Teaching materials a give it to students as the in the process of pembelajaran, while student worksheets given each of the learning processes takes place in the classroom to help students master the learning materials and the ability of creative thinking of students gradually. Aside from that students are given a homework assignment as an evaluation of each end of the meeting in the classroom. student worksheets and tasks related to the material of linear equations two variables that are associated with the cultural students around, to help students in improving the creative thinking ability of students gradually.

Ethnomathematics JUCAMA learning models leads the students more active in the learning process to solve the problems posed by the teacher or their classmates and create problems for the proposed related to cultures that exist around the students about the material linear equations two variable. According to Brunner, during the learning of the students presented the issues related to culture that can be encountered by the students in the residence of the student. The following is an example of the problems associated with the existing culture in the district Donggo to develop the creative thinking ability of students, namely:

Tembe Mee is a glove that became the hallmark of the community in district Donggo made of thread in the dip into the natural dyes made from the foliage around the people themselves. Tembe Nggoli the holster is distinctive of the people of Bima made of yarn colors, these gloves are often used in the event of the indigenous people of Bima. The process of making the Tembe Mee and Tembe Nggoli takes one month. Consider the example of the problem here Mr. Imran and Mr. Amir buy Tembe Mee and Tembe Nggoli, as a gift as memories for his friends at their place of work. They buy in the same place, namely in the village Mbawa, and do not have the receipt of purchase. The problem of result purchases made by Mr. Ali and Mr. Hasan can be seen in Table 1 below.

Table 1. The Problem is Mathematics Nuanced Ethnomathematics

Scabbard	Description
	Mr. Ali buys 4 Tembe Mee and 3 Tembe Nggoli with the price of Rp. 4.700.000,00
	Mr. Hasan buy 6 Tembe Mee and 4 Tembe Nggoli with price Rp. 6.800.000,00.

Create equations based on the explanation of Table 1. Solve linear equations in two variables by substitution and elimination. (measuring more than one way (flexibility)).

Teaching materials ethnomathematics developed to encourage students actively in the learning process. This is because there are problems in the teaching materials associated with cultures that exist around the students. In addition, the student can dig up information following the cognitive structures in constructing the new information to produce the learning process more meaningful as described in the theory of Ausubel, that the process of learning to associate with real-life will make the students can take. The process of learning the nuances of ethnomathematics is effectively applied in the classroom on subject anything. This corresponds to research previous results that show that problem-solving in models PBL ethnomathematics effective in improving student's problem-solving abilities (Purwanti, Zaenuri, & Asikin, 2020). Scientific learning nuanced ethnomathematics can be able to improve the ability of mathematical creative thinking of students when compared with learning using a scientific approach. The research results of others indicate that contextual learning with ethnomathematics affects the ability to solve the problem based on the level of thinking and contextual learning with ethnomathematics encourages problem-solving ability (Nur, Waluya, Rochmad, & Wardono, 2020). The results showed that teacher in-service

integrating approach ethnomathematics in learning geometry as learning materials, resources, and the context of learning (Sunzuma & Maharaj, 2020).

Learning with ethnomathematics JUCAMA learning models that associates the subject matter with the existing culture within the students, so that it can help students familiarize themselves to think that mathematicians are around. The results of previous research showed that the learning model 3CM is significantly effective to improve the ability of creative thinking of primary school teacher candidates teacher, students with a formal scheme, contents, and language of a good and complete will also have the ability of creative thinking mathematically better, mathematical creative thinking abilities of students is determined by the completeness of the scheme; and a good scheme and a complete (formal, content and linguistic) will help students to generate multiple alternative solutions to problems (Wahyudi, Waluya, Suyitno, & Isnarto, 2020). Applied learning in the classroom will influence the student's ability to confirm the information provided, so it needs to be done modification novelty in the learning model applied in the classroom. The result of research previously found that there are statistically significant differences between the scores of the motivation of academic achievement and creative thinking in favor of the post-application at the level (0.01) and this shows that the program has a positive influence in developing the motivation of academic achievement and creative thinking in mathematics among the students of the University of Sattam Bin Abdulaziz (Elsayed & Nasef, 2020). The results of another study show that there is a significant relationship between critical thinking skills and creative thinking skills. towards cognitive learning outcomes (Siburian, Corebima, Ibrohim, & Saptasari, 2019). Interposed in it, the results of another study showed that statistically increased the ability of mathematical creative thinking class creative problem solving medium standard, it can be concluded that there is an increase in the

ability of mathematical creative thinking of students who use the model of creative problem solving (Faturrohman & Afriansyah, 2020).

The influence of the habits of mind of creative thinking ability of students can be seen in the results of the regression test. Regression test shows that the habits of mind have a significant impact on the ability of creative thinking of students. This is in line with research previously that the habits of mind affect the ability of students problem solving and students inhibited on the indicator to implement the settlement plan and re-check the answers (Nurmala, Rohaeti, & Sariningsih, 2018). In addition, the results of the study others also find that there is a significant relationship between the mathematical habits of mind against the literacy skills of students mathematical (Eka et al., 2018). And the results of the research Qadarsih show that there is a significant influence on habits of mind toward mastery of the math concepts (Qadarsih, 2017). Meanwhile, according to the results of research by Indriani, Yuliani & Sugandi, that the student that his reasoning better are more likely to have the habit of thinking is better than students that his reasoning is less (Indriani, Yuliani, & Sugandi, 2018). In addition, other findings showed that the habit of mind plays an important role in problem solving and the teachers should be able to develop aspects (Yandari, Supartini, Pamungkas, & Khaerunnisa, 2019). Habits of mind as the affective aspect will influence the ability of creative thinking of students in the ethnomathematics JUCAMA learning model. This is because the students during the learning process given the material of linear equations two variables that are associated with cultures that exist around the students so that students are accustomed to thinking of mathematics as students are familiar with the culture around them.

CONCLUSION

Based on the results and discussion can be concluded that ethnomathematics JUCAMA learning models effective in improving the

creative thinking skills of the students that are average mathematical creative thinking abilities of students in classes taught with the ethnomathematics JUCAMA learning models reached the limit of completeness actual, average mathematical creative thinking abilities of students on the ethnomathematics JUCAMA learning models is of average mathematical creative thinking abilities of students who are taught with the model of problem-based learning, and to increase the ability of creative thinking of students in the medium category based on the criteria of test n-gain. There is the influence of the significant between the habits of mind of a mathematical of creative thinking skills of students.

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