THE EFFECTIVENESS OF LOCAL CULTURE BASED DISCOVERY LEARNING MODELS TO IMPROVE GEOMETRY PROBLEM SOLVING CAPABILITY

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Abstract
It is known that students' problem-solving abilities are still relatively low, there is a need for reasons so that an effective learning model can be developed and involves students in the learning process. The aim of this development research is to comprehensively examine the factors causing the low level of geometric problem-solving abilities that have occurred to date, as well as comprehensively examine the process and results of development models that meet the criteria for improving geometric problem-solving abilities. The research method used is development research or Research & Development (R&D) with the ADDIE model with the initial step of making a flow diagram. The stages include: (1). Analysis, (2). Design, (3). Development, (4). Implementation, and (5). Evaluation. The research subjects were students in junior high school. The results of the development research are a learning model that can be a supplement/alternative for teachers in the learning process, showing that the Bima Local Culturally Based Discovery learning model was validated by 6 experts with the results stating that it was valid, that the learning tool was a test instrument for higher geometric problem-solving abilities. compared to other learning tools. Based on product trials, it was also carried out to obtain data on the level of effectiveness of the learning process using the BL-based Discovery model which was developed in the form of effectiveness data obtained from the results of the initial test and the final test.

Keywords: Discovery Learning Model, Geometry Problem Solving, Local Culture

INTRODUCTION

The reality is that the quality of education in Indonesia has decreased, this is proven by the results of the 2018 Program for International Student Assessment survey that Indonesia is ranked 72nd out of 78 participating countries involved. This refers to the opinion of A. Schleicher (2019); OECD (2019), states that the quality of education in Indonesia is still far from expectations, so it is necessary to develop problem-solving abilities, especially in junior high school students.

According to Björn & Nurmi (2016); and Maf'ulah & Juniati (2020) that mathematical problem-solving abilities are an urgent matter for research. Problem solving ability is a general goal of teaching mathematics, especially in geometry lessons which include methods, procedures, and strategies. Therefore, problem solving abilities are very important to develop in learning mathematics. This refers to the opinion of Yu, Fan & Lin (2015); and Ke & Clark (2020) who stated that students' problem-solving abilities, especially in geometry lessons, can improve the quality of education in Indonesia. Each student will certainly be different.

in compiling and processing the information they get so that it is possible that each student has different problem-solving abilities (Susanti, 2020). Differences between students in solving geometry problems are due to differences in levels of thinking (Khoiriyah, 2013).

According to Amalia, et al., (2017) that problem solving ability is one of the basic abilities that students must have in learning mathematics. Problem solving is an attempt to find a way out of a difficulty, to achieve a goal that is not immediately achievable. In the problem-solving process, students are given the opportunity to play an active role in studying, searching, and finding information or data independently to be processed into concepts, principles, or conclusions. Based on this, problem solving has an important role in mathematics learning.

According to Bruner, discovery learning is a learning model that uses inquiry-based constructivist learning theory which occurs in problem-solving situations where students learn through existing knowledge and previous experience to find facts and relationships with the new material being studied (Bruner, 1961). The discovery learning model is a learning process that is obtained through observation or experimentation and creates a new learning atmosphere that can make students learn actively to discover their own knowledge so that student learning outcomes can improve (Astari, et al., 2018). In Discovery learning, students manipulate the domain by conducting

experiments, namely by manipulating variables and parameters in the domain and observing the effects of these manipulations (Saab, et al., 2005).

Through this learning model, students actively answer various questions or problems and solve problems to discover a concept where some or all the knowledge is discovered by themselves through teacher guidance (Nahdi, 2018 & Balim, 2009). Apart from that, students can prove hypotheses independently and play an active role in building their initial knowledge (Bailin, et al., 2018 & Swaak, et al., 2004). The application of this learning model will provide direct experience to students so that the learning process becomes more meaningful (Gunawan, et al., 2021). Discovery learning is centered on students and teachers as guides (Simamora & Saragih, 2019).

LITERATURE REVIEW

Local cultural character is something that is inherited or learned so that it changes something new for the educational process. Kesiman & Aguatini (2013); Pham & Renshaw (2015); and Kustyarini & Puspitasari (2020) state that the task of education as a cultural mission must be able to carry out several processes, namely cultural inheritance, helping individuals choose social roles and teaching them to carry out these roles, integrating various individual identities into a wider cultural scope, and becoming a source social innovation. The cultural diversity that exists in Indonesia is a good opportunity if it is related to education, especially learning including the local Bima cultural character.

Bima is known by the name Mbojo which comes from the word babuju, namely high land, which is a rather large male arch, the place where kings reside when they are inaugurated and sworn in, which is in Dara village, while the name Bima is the name of the ancestor of the first Bima kings. (Nuril, 2021; Mariani, 2022). Bima has several very good tourist attractions. One of the tourist destinations that has become Bima's identity is Uma Lengge. The Uma Lengge tourist destination is a cultural heritage of the Bima people which has ethno-mathematical value. These ethnomathematics values have not been widely applied in mathematics learning and have resulted in mathematics learning in schools not being able to display real contexts that are directly related to daily activities (Mariamah et al., 2020).

The noble cultural values possessed by the Bima community are invaluable potential. One thing that is inherent in Bima's identity is his philosophy of life and the universalization orientation of his philosophy which will be easily accepted by all mankind. The philosophy is "Maja Labo Dahu" meaning shame and fear, which is oriented towards peace and humanity. Maja Labo Dahu is a view of life that is carried out in thinking, acting, and speaking in society. with Maja Labo Dahu which is the philosophy of life, outlook on life and the controller of the life of the Mbojo (Bima) tribe (Jannah, 2020). Maja Labo Dahu is a symbol of the efforts of Bima religious and traditional circles to uphold al-amar bi-al ma'ruf wan-nahyu anil munkar among local communities (Komariah, 2018). In this expression, the value of high work ethic can also be seen, they will be very embarrassed if the tasks and work carried out are not successful and successful and fear God if the ways and methods of achieving success violate Islamic values (Nasaruddin & Syarifuddin, 2018). Therefore, it is necessary to integrate local Bima cultural characteristics in learning.

According to Fahrurrozi (2015), cultural learning is not something new, but culture-based learning is something that is being widely implemented in the world of education. Learning based on local cultural characteristics emphasizes mathematical practices that are rooted in culture (Palhares, 2012). Connecting culture and learning, there will be variations in learning from teachers, and students will be more interested in learning, besides that, learning that is linked to the culture in the surrounding environment will broaden insight and introduce local wisdom cultural values for both teachers and participants. education (Syahrin, et al., . 2016). According to Knijnik (2012) that culture-based learning in mathematics education can make learning more meaningful and can improve students' ability to connect with real world life. Cultural character-based learning in the field of mathematics is used to identify the nature of mathematics as human and cultural knowledge.

This view allows us to take a comparative look at cultural studies of mathematics describing different mathematical practices, not only to reveal

	Group A		Group B	
	Initial Test	Final Test	Initial Test	Final Test
The highest score	22.50	94.38	31.25	83.75
Lowest Value	11.25	51.88	7.50	68.75
Number of Students	25		27	

the diversity of mathematical practices but also to emphasize the complexity of each system (Francois, 2012). Morales' research findings underscore that the use of local culture, traditions, practices, beliefs, and native languages can help improve students' attitudes toward science (Morales, 2015).

RESEARCH METHODS

The research method used in developing this local culture-based Discovery learning model is Research & Development (R & D) with the ADDIE model discovered by Flora State University (Branch et al, 2014).

The choice of the ADDIE model is considered suitable because the development steps are in accordance with the research formulation and objectives. The research and development stages of the ADDIE model are the analysis, design, product development, implementation and trial and evaluation stages. These five stages correspond to the research variables that want to be revealed, namely the Discovery learning model, local culture and students' mathematical problem-solving abilities.

RESULTS AND DISCUSSION

The BL-based Discovery Model which has been revised based on implementation results is then re-evaluated for different classes at the evaluation stage. The evaluation aims to determine the effectiveness of the BL-based Discovery model that has been developed.

The geometric problem-solving ability test given is a written test in the form of a description consisting of 8 questions. The ability measured is the ability to solve geometric problems which consists of 5 indicators. Data on students' geometric problem-solving abilities before being given treatment can be seen from the initial test scores, and geometric problem-solving abilities after being given treatment can be seen from the final test scores.

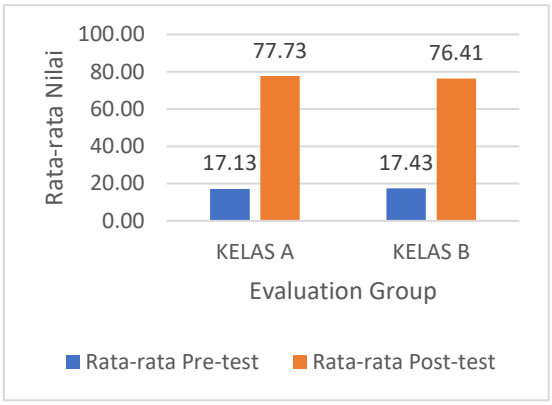
The initial ability data used in this research is the result data from the students' initial test before being given treatment, while the final ability data is obtained from the students' final test results. Data on students' initial and final tests are presented in the following table.

Table 1.1 Data on students' geometric problem-solving abilities.

In Table 1.1 above, the highest score in the initial test was 31.25, while in the final test it was 94.38. The lowest score on the initial test was 7.50 while on the final test it was 51.88. A complete analysis of students' geometric problem-solving abilities can be seen in the attachment.

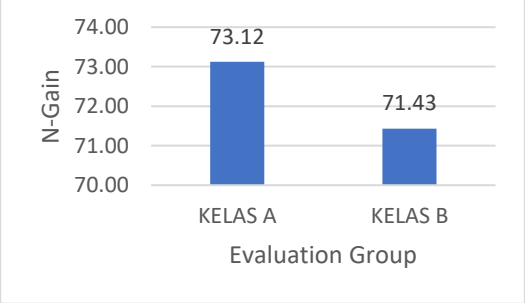
Initial test and final test data on geometric problem-solving abilities are also used to calculate the average score for each test and its improvement. Below is a picture regarding the average of the initial test and final test.

Figure 1.1 Average of Preliminary Test and Final Test of Students' Geometry Problem Solving Ability



Based on the picture above, the average students' geometric problem-solving abilities before being given treatment were 17.13 and 17.43, while the average students' geometric problem-solving abilities after being given treatment increased to 77.73 and 76.41. This increase is also visible in the average N-gain score. The average N-gain percentage can be seen in the following image.

Figure 1.2 Average Percentage N-Gain of Students' Geometry Problem Solving Ability



The picture above shows that the average percentage increase in class B-SMPN Bima City is 73.123% and class A-SMPN Bima is 71.43%. The

average increase in geometric problem-solving abilities of students in these two classes is in the high category (72.28%). A complete analysis of N-gain on geometric problem-solving abilities can be seen in the appendix.

Geometry problem solving ability data was also analyzed to determine the percentage of each indicator. Based on the results of tabulation of scores and calculations of students' geometric problem-solving ability tests for each indicator of geometric problem-solving ability (IPM), the percentage of IPM-1 to IPM-5 scores in both classes is obtained as shown in Table 1.2 below.

Table 1.2a Average Preliminary Test Ability to solve geometric problems for each indicator.

Class	Average value IPM (%)				
	IPM-1	IPM-2	IPM-3	IPM-4	IPM-5
Class A	23%	17%	17%	16%	13%
Class B	23%	15%	18%	18%	14%

Table 1.2b Final Test Average Geometry problem solving ability for each indicator.

Class	Average value IPM (%)				
	IPM-1	IPM-2	IPM-3	IPM-4	IPM-5
Class A	93%	76%	88%	71%	65%
Class B	63%	57%	61%	58%	56%

The table above is the average percentage of geometric problem solving ability for each indicator showing that in the initial test IPM-1 got an average percentage score of 23% for class A and class B. IPM-2 got an average percentage score of 17% for class A and 15% for class B, while for the two classes in IPM-3, IPM-4 and IPM-5 respectively it is 17%, 18%; 16%, 18%; 13% and 14%.

The table above also shows that in the final test the IPM that got the highest percentage was IPM-1 for both classes, while the HDI that got the lowest score was IPM-5 for both classes. Based on the two tables above, each indicator has increased.

DISCUSSION

The implementation of the learning process carried out by the teacher has an impact on the activities carried out by students in class. The data measured in the learning process, namely students' ability to solve geometric problems, is based on the results of LKPD work. The LKPD carried out by the students includes five indicators of geometric problem-solving abilities at each step of the activity therein. Indicators of geometric problem-solving abilities contained in the LKPD include problem identification, problem description, application of special mathematical concepts, mathematical procedures, and logical conclusions. LKPD with the BL-based Discovery learning model provides opportunities for students to play an active role in learning.

Based on the results of the overall score obtained on the LKPD completed by students, it appears that at the first meeting with the cube and block sub-material, the average percentage of students' score was 64.33%, where this percentage had the smallest value among the percentages at the second meeting, and third. This happens because students are still not used to working with LKPD which contains indicators of their ability to solve geometric problems. Apart from that, students also don't know the terms or commands in the worksheet. The results of this research are in line with research conducted by Faturohman & Afriansyah (2020) which states that when working on LKPD, students still need to be guided by researchers because students are not used to using LKPD as a learning medium. However, at the second and subsequent meetings the learning can be conditioned according to the plan. Research conducted by Wijayanti & Widiyatmoko (2015) also showed that each meeting experienced an increase in the percentage of creative attitudes, where in the fourth meeting the highest average was obtained, students made creative presentations according to the draft that had been designed.

Apart from that, students' geometric problem-solving abilities during learning are also analyzed based on indicators. as explained in the research results, it was found that the highest gain was in the problem identification indicator, while the indicator with the smallest average percentage gain was the logical conclusion indicator. The highest average percentage obtained on the problem identification indicator was because students were able to identify problems based on basic concepts, create data on known quantities, and determine the quantities in question. Students' geometric problem-solving abilities for problem identification indicators increased at the third meeting. The results of this research are in line with research conducted by Bahtiar et al., (2022) which states that the problem identification indicator is placed in the highest position among other problem-solving indicators. Findings during the learning process also showed

that students were enthusiastic and active, because the discussion activities carried out through culture based LKPD were a new experience that students rarely had when learning mathematics.

CONCLUSION

The Local Culture-based Discovery learning model meets the criteria of being valid, practical, and effectively developed to improve students' geometric problem-solving abilities. Therefore, the BL-based Discovery learning model can be used as an alternative mathematics learning model in schools, so that students can have the idea that learning mathematics does not just stop at mathematics but has benefits for other fields and everyday life.

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