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Improving Students' Ability to Solve Space Building Problems Through the Bamboo Dancing Learning Model in Elementary School

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ABSTRACT

Purpose of the study: This study aimed to investigate the effectiveness of the bamboo dancing learning model in enhancing students' problem-solving skills related to spatial geometry.

Methodology: Conducted as Classroom Action Research (CAR), the study was implemented in two cycles, each consisting of four stages: planning, action, observation, and reflection. Data collection methods included observation, tests, and documentation. The subjects were 24 students from VD class at SDN No.13/1 Muara Bulian, comprising 12 female and 12 male students.

Main Findings: The study found that the bamboo dancing learning model significantly improved students' problem-solving abilities in spatial geometry. This model involved students working on problems through discussions with partners, followed by a rotation to new partners, mimicking the movements of bamboo dancing. Varied learning media were used in each cycle to enhance the learning process. In the first cycle, the success rate of students' problem-solving abilities was 61.01%, categorized as sufficient. By the second cycle, the success rate increased to 81.64%, categorized as good. These results indicate that the bamboo dancing learning model met the research achievement indicators, demonstrating its effectiveness in improving students' spatial problem-solving skills.

Novelty/Originality of this study: This research is innovative as it combines spatial mathematics with the performing art of bamboo dancing. This interdisciplinary approach not only enhances students' geometric problem-solving skills but also enriches their learning experiences by integrating physical movement and cultural elements. By visualizing and physically practicing spatial concepts through bamboo dancing, students internalize the material more effectively.

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1. INTRODUCTION

Learning is a process of interaction that occurs between educators and students to achieve certain goals [1]-[3]. According to Al-Tabany [4] Learning is a conscious effort by a teacher to teach students (directing student interaction with other learning resources) in order to achieve the expected goals. One of them is learning mathematics. The objectives of mathematics learning are stated in the Republic of Indonesia Minister of National Education Regulation No. 19 of 2005 is that students have the ability to understand mathematical concepts and solve problems which includes the ability to understand problems, design mathematical models, solve and interpret the solutions obtained.

Based on the results of observations made by researchers in class V D at State Primary School No 13/1 Muara Bulian, several problems were found in the learning process that could interfere with the success of learning. In the learning process, researchers saw that teachers were more active in learning. Learning seems to predominantly use expository and assignment methods. So that when students were given a problem by the teacher, 17 students seemed confused in solving the problem, there were even 6 students who always did not finish working on the questions given by the teacher. Students don't seem to understand the questions given by the teacher, don't understand what elements are known in the questions, what elements are asked about in the questions, and what the core problem is in the questions. In fact, there were 7 students who only answered questions by writing down the answers without writing down the steps in solving the questions. There are 17 out of 24 students in class V D who still have difficulty solving mathematical problems about geometric figures.

In accordance with the mathematics learning objectives stated in the Minister of National Education Regulation, mathematical problem solving needs to be instilled and paid attention to properly and correctly. In learning mathematics, learning is needed that places more emphasis on problem-solving abilities within it [5]-[7]. One way to achieve good learning results and goals is by implementing innovative learning models that can make the learning process fun, students are more attentive and interested so that learning goals can be achieved [8]-[10]. In line with Kosasih's opinion in Zuraida [11] which states that the learning model used by teachers greatly influences student success and learning outcomes.

One learning model that can make students enthusiastic and interested in following the learning process and can make students able to solve problems is the bamboo dancing learning model [12], [13]. Latifah et al., [14] stated that the bamboo dancing learning model is a type of cooperative learning which emphasizes cooperation between one student and the student in front of him in order to solve a problem. This aims to make mathematics learning more interesting for students and provide students with the opportunity to exchange ideas and come up with new ideas with their friends so that students will more easily understand the material and solve problems given by the teacher.

The urgency of this research lies in the importance of improving students' problem solving abilities in mathematics learning, especially in geometric material. This ability is essential because it helps students develop the critical and analytical thinking skills needed in their daily lives and academic future. However, conventional learning methods are often less effective in developing these skills, so innovative and interesting approaches are needed. The purpose of this study was to find out the application of bamboo dancing learning models to improve students' ability to solve problems in building space.

2. RESEARCH METHOD

The place of this research is State Primary School No 13/1 Muara Bulian, Batanghari Regency, Jambi Province. The time for this research will be carried out in the even semester. The subjects in this classroom action research were all class V D students at State Primary School No 13/1 Muara Bulian. Where the total number of students in the class is 24 students, consisting of 12 female students and 12 male students.

The data in this classroom action research consists of qualitative data and quantitative data. Qualitative data in the form of observation reports obtained from observation sheets in each learning cycle sourced from teachers and students. Meanwhile, quantitative data consists of the results of student observations and tests in solving spatial building problems obtained from the results of pretest and posttest students in class V D in each learning cycle. The data sources in this classroom action research are primary data sources obtained directly from teachers and students in learning activities that occur in class V D State Primary School No 13/1 Muara Bulian, as well as secondary data sources in the form of learning documents related to test results. students' abilities in solving spatial building problems in class V D State Primary School No 13/1 Muara Bulian, learning implementation plans, and syllabus.

In this classroom action research, the researcher uses participatory observation, namely the researcher is directly involved with the daily activities of the person being observed or used as a source of research data [15]. Observations consist of observing students' abilities in problem solving and observing teacher activities in implementing the bamboo dancing learning model.

The problem solving assessment for each student can be calculated using the following formula:

$$Score = \frac{total\ score}{many\ scores} \times 100 \quad \text{.....(1)}$$

The average class value can be found using the following formula:

$$\bar{x} = \frac{\sum X}{\sum N} \quad \text{.....(2)}$$

Information:

$\bar{x}$ = average value

$\sum X$ = Sum of all student grades
$\sum N$ = number of students

Tests are used to obtain data about student learning outcomes [16]. In this research, tests are used to measure the level of students' abilities in solving geometric problems. The test used in this research was a written test (objective description) using questions related to the volume of geometric shapes in class V elementary school. Tests are carried out in each learning cycle to determine the level of students' abilities in problem solving after action has been taken by the researcher.

According to Sugiyono [17] documents are records of events that have passed. Documents can be in the form of writing, drawings, or monumental works by someone. In line with this, Arikunto [18] also said that the documentation method is looking for data regarding things or variables in the form of notes, transcripts, books, newspapers, magazines, inscriptions, meeting minutes, agendas, and so on. In this research, documentation can be in the form of learning implementation plans, syllabus, and test result documents from students.

The data validity test is used by researchers to determine the validity of the data. Data is said to be valid if there is no difference between the data reported by the researcher and the data that actually occurs in classroom learning. Data validity testing can be done through triangulation. In this research, researchers used source triangulation, technique triangulation, and time triangulation. The results of observations of teacher activities and student activities were analyzed using qualitative data analysis. After getting the data, then give a score according to the indicators carried out, then describe the results.

Quantitative data analysis was carried out on the results of observations and student test results which were carried out using the following formula:

$$Score = \frac{total\ score}{many\ scores} \times 100 \ldots\ldots.(3)$$

Table 1. Level of Action Success

Success Value	Level of Success
85% - 100%	SK (Very Good)
75% - 84,99%	B (Good)
65% - 74,99%	C (Fair)
55% - 64,99%	K (Less)
<55%	SK (Very Poor)

After getting each individual's score and determining the predicate, then calculate completeness classically using the following formula:

$$P = \frac{\sum students\ who\ have\ completed\ their\ studies}{\sum students} \times 100\% \ldots\ldots\ldots\ldots(4)$$

The assessment performance in classroom action research is determined as follows:

1. This classroom action research is said to be successful if students have experienced an increase in their ability to solve spatial problems from the initial conditions and the conditions after learning using the bamboo dancing learning model until the completion of the action.
2. Student learning outcomes are categorized as complete individually if they achieve a score of ≥65 in accordance with the minimum completeness criteria that apply at State Primary School No 13/1 Muara Bulian.
3. Student learning outcomes are said to be classically complete if students whose scores are above the minimum completeness criteria reach ≥75% of students in that class or 18 students out of a total of 24 students, then it can be said to be classically complete.

Classroom action research is structured research. In this research, researchers refer to the Kemmis and Mc Taggart model. The research will be carried out in several cycles, which in one cycle or round consists of four stages which include planning, implementing actions, observing and reflecting.

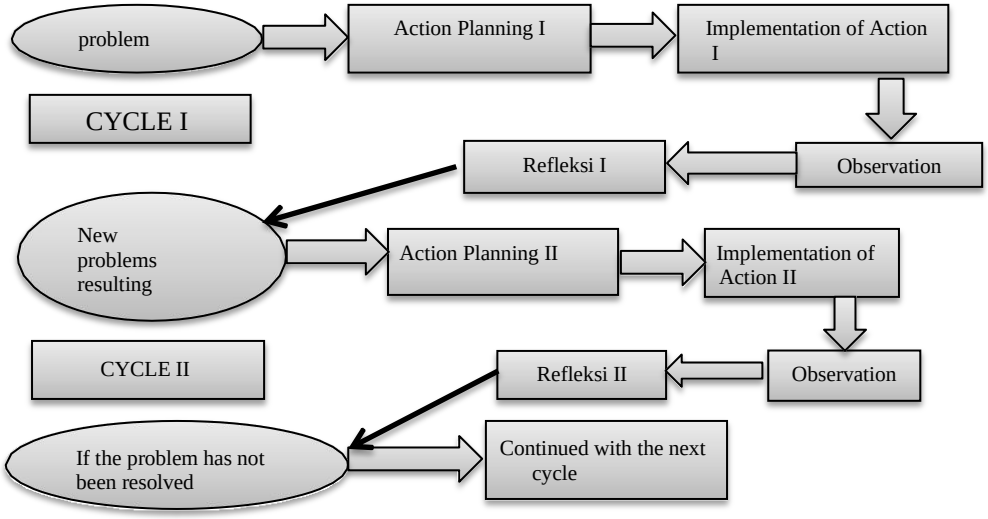

Figure 1. Classroom Action Research Model According to Kemmis & Mc Taggart.

3. RESULTS AND DISCUSSION

This classroom action research was conducted at State Primary School No 13/1 Muara Bulian. The researcher asked permission from the principal of State Primary School No 13/1 Muara Bulian to conduct research at the school. He also gave permission and asked to meet the homeroom teacher in the class he wanted to research to discuss the research schedule. During the meeting, the researcher conveyed the aim of the research to be carried out, namely improving mathematical problem solving abilities in spatial construction material.

In this research, teachers and students were observed during the learning process using the bamboo dancing learning model. This research was carried out in mathematics learning about spatial shapes, in basic competency 3.5 explaining and determining the volume of spatial shapes using volume units (such as unit cubes). The research results were obtained from observations of teacher activities in implementing the bamboo dancing learning model which were analyzed qualitatively, as well as the results of observations of student activities in problem solving and test results which were analyzed qualitatively and quantitatively.

3.1 Description of Research Cycle I Meeting I

Meanwhile, cycle I, meeting I was carried out on Basic Competency 3.5 explaining and determining the volume of geometric shapes using volume units (such as unit cubes). As for the actions at this first meeting, students were given actions using the bamboo dancing learning model with volume material (cubes) and were assisted by using Rubik's media.

Action Implementation Planning Stage Cycle I Meeting I

Researchers designed actions to be taken to improve problem solving abilities through implementing the bamboo dancing learning model in the V D class at State Primary School No 13/1 Muara Bulian. The plans made include preparing a learning syllabus, making lesson plans that are in accordance with the steps of the bamboo dancing learning model and adapted to the material to be taught, preparing learning materials and media, preparing observation sheets on students' problem solving abilities, and preparing observation sheets on teacher activities in implementation. bamboo dancing model.

Action Implementation Stage Cycle I Meeting I

Cycle I was carried out in two meetings. The first meeting was held on learning about spatial shapes, namely the volume of a cube, with the application of the bamboo dancing learning model to improve students' abilities in solving spatial geometric problems. The implementation of the action is carried out based on the steps of the bamboo dancing learning model which have been included in the learning implementation plans created by the researcher.

Action Research Observation Stage Cycle I Meeting I

Based on the results of the observations, it can be seen that of the 23 students, there were 4 students who were in the very poor (SK) category, namely AT, KDK, MR, and MRA. 6 students are in the poor category (K), namely AY, BA, DP, KLA, MF, and MZ. 9 students are in the sufficient category (C), namely AD, GFA, IPD, KNA, KS, MJA, NZ, NO, and VTPL. 4 students are in the good category (B), namely ANK, ARW, DAS, and WZ. In the first cycle of this first meeting, there were no students in the very good (SB) category. The

results of these observations are seen based on 4 indicators of problem solving which have scoring for each indicator.

The observation results on the indicator of understanding the question (understanding the problem) reached 72.82. The results of observations on the indicator of planning how to solve questions only reached 61.95% of students who were able to plan how to solve questions. Observation results on the indicator of implementing a problem solving plan through calculations are still low, reaching 48.91% of students who are able to carry out a problem solving plan. The results of observations on the indicators for re-checking the process and results are still very low, namely only reaching 41.30%. This can be seen from 23 students, only around 9 students were able to check the process and results again, while the other 14 students were not able to check their own work.

3.1.1 Description of Research Cycle I Meeting II

Meanwhile, cycle I, meeting II was carried out on Basic Competency 3.5, explaining and determining the volume of geometric shapes using volume units (such as unit cubes). As for the actions at this second meeting, students were given actions using the bamboo dancing learning model with material on geometric volumes (blocks). Assisted by using the media of 2 Rubik's cubes combined to form a block.

Action Implementation Planning Stage Cycle I Meeting II

Researchers designed actions to be taken to improve problem solving abilities through implementing the bamboo dancing learning model in the V D class at State Primary School No 13/1 Muara Bulian. The plans made include preparing lesson plans that are in accordance with the steps of the bamboo dancing learning model and adapted to the material to be taught, preparing learning materials and media, preparing observation sheets on students' problem solving abilities, preparing observation sheets on teacher activities in implementing the bamboo dancing model, and prepare evaluation test sheets to determine the level of students' problem solving abilities.

Action Implementation Stage Cycle I Meeting II

Cycle I was carried out in two meetings. Meeting II was held on learning about spatial shapes, namely the volume of a cube, with the application of the bamboo dancing learning model to improve students' abilities in solving spatial geometric problems. The implementation of the action is carried out based on the steps of the bamboo dancing learning model which have been included in the learning implementation plans created by the researcher.

Action Research Observation Phase Cycle I Meeting II

Based on the results of the observations, it can be seen that of the 24 students, there were 3 students who were in the very good (SB) category, namely ANK, ARW, and WZ. 6 students are in the good category (B), namely AD, DAS, KNA, KS, MJA, and NO. 9 students are in the sufficient category (C), namely AY, BA, DP, GFA, IPD, KDK, NZ, VTPL and RK. 6 students are in the poor category (K), namely AT, KLA, MR, MF, MZ, and MRA. In cycle I, meeting 2, there were no students in the very poor (SK) category. The results of these observations are seen based on 4 indicators of problem solving which have scoring for each indicator.

The results of observations on the indicator of understanding the questions (understanding the problem) reached 85.41% of students who were able to understand the questions (understanding the problem) given by the teacher. This can be seen from 24 students, there are around 20 students who are able to understand the questions. The results of observations on the indicator of planning how to solve questions reached 64.58% of students who were able to plan how to solve questions. This can be seen from the 24 students, only around 15 students were able to plan how to solve the questions, while the other 9 students were not able to plan how to solve the questions.

The results of observations on the indicators of implementing the question solving plan through calculations reached 68.75% of students who were able to carry out the problem solving plan. This can be seen from the 24 students, there are around 16 students who have been able to carry out the problem solving plan. This is proven by students being able to carry out the solution plan that has been made, students also starting to be able to carry out calculations using formulas according to the problems in the problem. Meanwhile, 8 other students did not meet these indicators. Observation results on indicators checking the process and results of work only reached 42.70%. This can be seen from the 24 students, only about 10 students were able to check the process and results of their work, while the other 14 students were not able to check the process and results of their work.

3.2 Observation of Teacher Activities in Implementing the Bamboo Dancing Learning Model in Cycle I

Teacher observations in implementing the bamboo dancing learning model were carried out using observation sheets. Based on the results of observations, there are several shortcomings in this first cycle,

including that the teacher has not conveyed apperception and motivation in learning, and because time is limited, the teacher and students do not carry out questions and answers at the end of the lesson.

3.3 Action Research Reflection Stage Cycle I

Based on the implementation of the learning process using the bamboo dancing learning model in cycle I, the results of observations of students' ability in problem solving was 61.01%, at the first meeting it was 55.52% and there was an increase in the second meeting, namely 10.98% to 66 .5%, and the test results in cycle I with classical completeness were 62.5%. It can be concluded that in cycle I there were still many shortcomings, both in meeting I and meeting II. The shortcomings in cycle I include:

1. Students are still difficult to condition because there are too many members in one group. In cycle I the teacher only divided the class into two groups so that it was difficult to condition the students.
2. Students are still less enthusiastic when starting learning activities. This is because the teacher does not provide anything new when starting learning.
3. Students are still confused when changing groups, this is because the teacher is unable to condition the students.
4. Students still have difficulty solving problems in the practice questions given by the teacher.
5. Students are less interested in the media the teacher brings, this is because the media used is too small so students don't pay much attention when the teacher explains the material.

The following is an action plan to correct deficiencies in cycle I that will be carried out in the implementation of cycle II, including the following:

1. The teacher will divide the class into 4 groups, so that students can be more easily conditioned.
2. When making shifts, the teacher will calculate when to shift and when to stop so that the shift is not chaotic.
3. The teacher will explain the material using more concrete objects so that students can better understand the material explained by the teacher, namely by using cardboard building media.
4. The teacher will provide media to each pair, namely media in the form of spatial shapes made from cardboard and decorated using colored paper and wrapping paper so that they attract more students' attention.
5. The teacher will provide problems using this media so that students can understand better and be able to solve the problems given by the teacher.

3.4 Description of Research Cycle II Meeting I

Meanwhile, cycle II, meeting I, was carried out on Basic Competency 3.5 explaining and determining the volume of geometric shapes using volume units (such as unit cubes). As for the actions at this first meeting, students were given actions using the bamboo dancing learning model with volume material (cubes) and were assisted by using cube shapes made from used cardboard.

Action Implementation Planning Stage Cycle II Meeting I

Researchers designed actions to be taken to improve problem solving abilities through implementing the bamboo dancing learning model in the VD class at State Primary School No 13/1 Muara Bulian. The plans made include preparing lesson plans that are in accordance with the steps of the bamboo dancing learning model and adapted to the material to be taught, preparing learning materials and media, preparing observation sheets on students' problem solving abilities, and preparing observation sheets on teacher activities in implementing the bamboo dancing model.

Action Implementation Stage Cycle II Meeting I

Cycle I was carried out in two meetings. The first meeting was held on learning about spatial shapes, namely the volume of a cube, with the application of the bamboo dancing learning model to improve students' abilities in solving spatial geometric problems. The implementation of the action is carried out based on the steps of the bamboo dancing learning model which have been included in the learning implementation plans created by the researcher.

Action Research Observation Stage Cycle II Meeting I

Based on the results of the observations, it can be seen that of the 22 students who attended, there were 6 students who were in the very good (SB) category, namely ANK, ARW, DAS, NO, VTPL, and WZ. 10 students are in the good category (B), namely AD, DP, AT, GFA, IPD, KNA, KS, MF, MJA, and NZ. 5 students are in the sufficient category (C), namely AY, BA, KDK, KLA, MR. 1 student is in the poor category (K), namely MRA, and there are no students in the very poor category. This indicates that there is an increase in problem solving abilities in cycle II when compared to cycle I.

The observation results on the indicator of understanding the question (understanding the problem) are high, namely reaching 92.04%. This proves that almost all students in class V D have been able to understand the questions. This can be seen when the teacher gives a problem (question) in the learning process, around 20 people are able to understand the problem in the question, are able to identify known elements in the question, and are able to know what is being asked in the question.

The results of observations on the indicator of planning how to solve questions reached 78.40% of students who were able to plan how to solve questions. This can be seen from the 22 students who attended, there were around 17 people who were able to plan how to solve the questions. This is proven by students being able to determine which formula to use to solve the problem in the problem, students are also able to create methods or steps in solving the problem in the problem. Meanwhile, the other 5 students were not able to fulfill these indicators well.

The results of observations on the indicators of implementing the problem solving plan through calculations reached 81.81% of students who were able to carry out the problem solving plan. This can be seen from 22 students, there were around 18 students who were able to carry out the problem solving plan. This is proven by students being able to carry out the solution plan that has been made, students being able to carry out calculations using formulas that are appropriate to the problem in the problem. while the other 4 students have not met these indicators.

The results of observations on indicators of re-checking the process and results reached 59.09% of students who were able to check the process and results that had been obtained. This can be seen from the 22 students, there were around 13 people who were able to check the process and results, while 9 other people were not able to check the process and results obtained. This is evidenced by students not being able to check the suitability of the solution steps to the problems contained in the questions, and students not being able to check the results of their work again.

3.4.1 Description of Research Cycle II Meeting II

The second cycle of this second meeting was carried out on Basic Competency 3.5, explaining and determining the volume of spatial shapes using volume units (such as unit cubes). As for the actions at this second meeting, students were given actions using the bamboo dancing learning model with material on building volumes (blocks) and were assisted by using media in the form of block shapes made from used cardboard.

Action Implementation Planning Stage Cycle II Meeting II

Researchers designed actions to be taken to improve problem solving abilities through implementing the bamboo dancing learning model in the V D class at State Primary School No 13/1 Muara Bulian. The plans made include preparing lesson plans that are in accordance with the steps of the bamboo dancing learning model and adapted to the material to be taught, preparing learning materials and media, preparing observation sheets on students' problem solving abilities, preparing observation sheets on teacher activities in implementing the bamboo dancing model, and prepare evaluation test sheets to determine the level of students' problem solving abilities.

Action Implementation Stage Cycle II Meeting II

This learning process was carried out using the bamboo dancing learning model with learning material, namely the volume of blocks. At meeting II, learning activities were carried out using block-shaped media made of cardboard. The researcher made 12 blocks of media which were decorated using wrapping paper to attract more students' attention. The activities carried out consist of preliminary activities, core activities and closing activities.

1. Preliminary Activities

Preliminary activities contain routine activities, namely the teacher opens the lesson by saying greetings, students respond to the teacher's greetings. The teacher asked the class leader to lead the prayer, and all the students prayed together. The teacher asked how the students were and the students answered "Alhamdulillah yes yes yes" and carried out the student's attendance. In cycle II of this second meeting, all students in class V D were present, namely 24. Then the teacher carried out an apperception by asking what lessons had been learned at the previous meeting, and the teacher presented the material that would be studied that day. The teacher shows the media he has brought and the students observe the media and are very enthusiastic about learning.

2. Core Activities

The teacher shows media in the form of blocks made of cardboard, students observe the media and the teacher asks students to come forward to show which ones are called ribs, which ones are called sides, and which ones are called corner points. Students move forward in turn. The teacher presents the material that will be

studied that day. The teacher divides the class into 4 groups, each group consisting of 6 people who are divided by counting. Then the teacher asks students to prepare rulers, paper and pens. After that, all groups come to the front of the class and line up in a row, group 2 faces group 3, and group 1 faces group 4.

After the students line up in a row and have found their respective partners, then the teacher gives a problem that must be solved by the students by how to discuss with each partner. The problem given by the teacher in cycle II of this second meeting was different from the previous cycle, namely that each pair was given a block of media and had to find the volume of each block. Students begin to measure the length, width and height of the blocks using a ruler. Students work together with their partners to solve the problem. The teacher gives 10 minutes to discuss with the initial partner and solve problems on one block. After the time is up, all students stand up and move clockwise like a bamboo dance. The teacher regulates when to start shifting and when to stop. After stopping, students will get different pairs and get different problems (blocks). Then the students return to solving the problem with their new partner. Shifts were made 3 times. Once finished, all students write down the results of their work and return to their seats.

The next step is for each group representative to present the results of their work in front of the class. And other groups respond and can ask questions. Teachers also facilitate students whose work results are different to come forward to convey the results of their work. Then the teacher provides reinforcement so that there is no misunderstanding of the material.

3. Closing Activities

Before closing the lesson, the teacher invites students to conclude the material they have learned today. And the teacher said don't forget to study the material at home. The teacher asks one of the students to lead the prayer, the students pray together. The teacher closes the lesson by saying hello.

Observation Phase of Action Research Cycle II Meeting II

Based on the results of the observations, it can be seen that of the 24 students, 14 students were in the very good (SB) category, namely AD, ANK, ARW, DP, DAS, GFA, IPD, KNA, KS, MJA, NO, RK, VTPL, and WZ. 5 students are in the good category (B), namely BA, KLA, MF, MZ, and NZ. 5 students are in the sufficient category (C), namely AY, AT, KDK, MR, and MRA. In cycle II, meeting 2, no one was in the poor or very poor category.

The results of observations on the indicator of understanding the questions (understanding the problem) have reached 94.79% of students who are able to understand the questions. This can be seen from 24 students, there are already around 22 students who can understand the questions correctly. This is proven by students being able to understand the problem in the question, being able to identify known elements in the question and being able to know what is being asked in the question.

The results of observations on the indicator of planning how to solve questions have also reached 86.45% of students who are able to plan how to solve questions. This can be seen from 24 students, there are around 20 students who are able to plan how to solve the questions. This is proven by students being able to determine which formula should be used to solve the problem in the question, students have also been able to create methods or steps in solving the problem in the question.

The results of observations on the indicator of carrying out problem solving through calculations have reached 89.58% of students who are able to carry out the problem solving plan. This can be seen from the 24 students, there are around 21 students who have been able to carry out the problem solving plan. This is proven by students being able to carry out calculations using formulas according to the problem in the problem. In cycle II, meeting 2, there were 3 students who were not able to meet this indicator. Actually, I am able to use the formula, but there are still many mistakes in the calculations.

The observation results on the indicators for re-checking the process and results have reached 69.79%. This can be seen from 24 students, there are 8 students who have not been able to review the process and results of their work, 16 other students have been able to check the results obtained. This is proven by students being able to check the suitability of the steps in solving the problem with the problems contained in the problem, students being able to re-examine the results of their work and having the courage to explain the results obtained in accordance with the problems in the problem.

3.5 Observation of Teacher Activities in Implementing the Bamboo Dancing Learning Model in Cycle II

Teacher observations in implementing the bamboo dancing learning model were carried out using observation sheets. Based on observations in cycle II, this has experienced an increase. The teacher in implementing the bamboo dancing learning model has implemented it according to the steps of the model. Teachers no longer divide students into 2 groups but instead divide students into 4 groups. So that students are more easily conditioned.

Apart from that, the teacher also uses learning media that attracts students' attention, namely spatial shapes made from used cardboard and decorated using attractive colors in larger sizes. So that students focus

more attention on the teacher. The teacher also provides problems related to media so that students are more enthusiastic about solving problems together with their partners. It can be concluded that cycle II was carried out well.

3.6 Action Research Reflection Stage Cycle II

The results of observations and written test results in cycle II showed that the actions carried out in cycle II had gone better than in cycle I. This was marked by an increase in students' abilities in solving spatial problems through the bamboo dancing learning model.

At the first meeting of cycle I, the results of observations regarding students' abilities in solving geometric problems were 55.52% and increased at meeting II, namely 10.98% to 66.5% and the results of the written test in cycle I with classical completeness were 62.5%. In cycle II, meeting I, the results of observations of students' ability in solving geometric problems was 77.95% and there was an increase in meeting II, namely 7.38%, to 85.33% and the results of the written test in cycle II with classical completeness were 83 .33%.

It can be concluded that cycle II can be said to be successful according to the following research achievement indicators:

1. Classroom Action Research is said to be successful if there has been an increase in students' ability to solve problems from the initial conditions and the conditions after the learning action was carried out using the bamboo dancing learning model until the completion of the action which received a score in the good and very good categories, namely 19 person.
2. Student learning outcomes are categorized as complete individually if they reach a score of ≥65, namely 20 people.
3. Student learning outcomes are said to be classically complete if students whose scores are above the Minimum Completeness Criteria ≥75% of the total number of students or in the good category are 83.33%.

3.7 Comparison of Action Results Between Cycles

3.7.1 Comparison of Observation Results in Cycle I and Cycle II

Comparison of the results of observations of problem solving abilities in cycle I and cycle II can be seen in the following table:

Table 5. Comparison of Observation Results of Students' Ability in Solving Space Building Problems

No	Aspect	Percentase (%)				
		Pre cycle	Cycle I		Cycle II	
			Meeting I	Meeting II	Meeting I	Meeting II
1	Percentage	36,87%	55,52%	66,5%	77,95%	85,33%
Total percentage each cycle		36,87%	61,01%		81,64%	

Based on the table above, the increase can be presented in the form of a bar chart as follows:

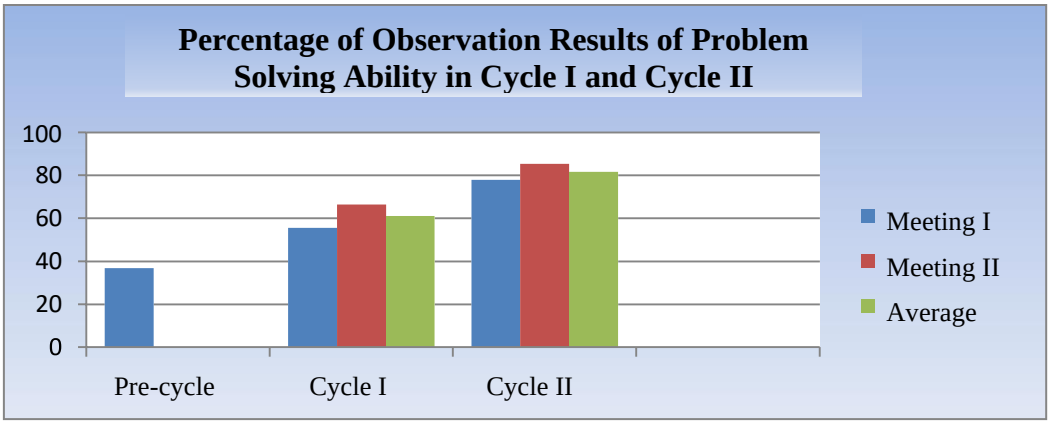

Figure 2. Comparison diagram of research observation results from Cycle I and Cycle II

3.7.2 Comparison of Test Results in Cycle I and Cycle II

A comparison of test results in cycle I and cycle II can be seen in the following table:

Table 6. Comparison of Test Score Percentages in Cycle I and Cycle II

No	Aspect	Percentase		
		Pretest	Cycle I	Cycle II
1	Classical percentage of success	16,67%	62,5%	83,33%

Based on the table above, the improvement in classical test results in cycle I and cycle II can be presented in the form of a bar chart as follows:

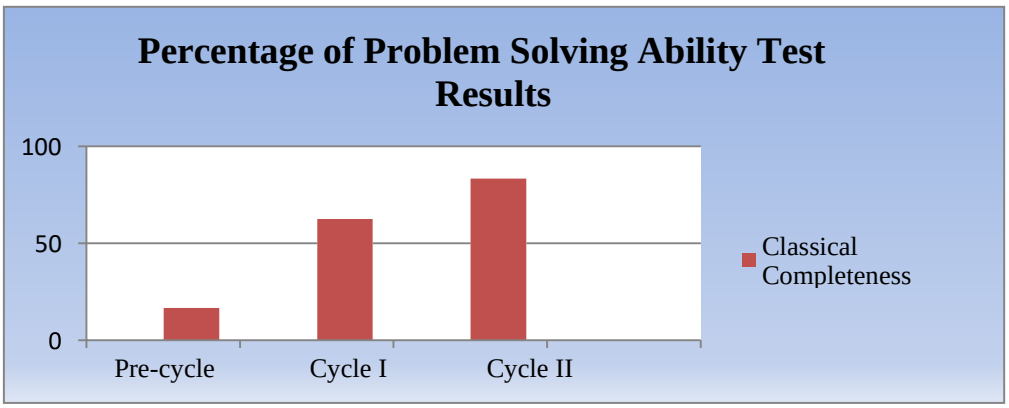

Figure 3. Percentage Diagram of Problem Solving Ability Test Results for Cycle I and Cycle II

This research was conducted in class V D of State Primary School No 13/1 Muara Bulian. After conducting initial observations, problems were found regarding students' low ability in solving mathematical problems. Students still cannot understand the questions and students still look confused in solving problems in the questions given by the teacher.

Based on the results of initial observations, the researcher then gave pretest questions to see the level of students' abilities in solving problems in spatial construction material. During the pre-test, there were only 4 students in class V D whose scores met the minimum completion criteria set at the school, namely 65. This shows that only 16.67% of the total number of students showed an average score in accordance with the completion criteria. minimum. This shows that student learning outcomes are not optimal, which is indicated by low problem solving abilities, and immediate action must be taken to improve the learning process which indicates problem solving abilities. According to Polya's opinion in Harmini & Roebyanto [19] "problem solving is a process or effort to find a way out of a difficulty in order to achieve a goal that cannot be achieved immediately". Apart from influencing the learning process, this problem-solving ability will ultimately lead to student learning outcomes, so action must be taken to improve it.

In this research, researchers have collaborated with the V D class teacher, and determined the action to be taken, namely by implementing the bamboo dancing learning model. In implementing this bamboo dancing learning model, students will exchange ideas with their partners and experience several changes of partners in order to solve a problem. According to Latifah et al., [14] the bamboo dancing learning model is a type of cooperative learning which emphasizes cooperation between one student and another student in order to solve a problem. The researcher determined the bamboo dancing learning model to improve students' abilities in solving spatial problems in class V D State Primary School No 13/1 Muara Bulian by giving students problems related to spatial construction. Later, students will be given several shapes of geometric shapes (blocks and cubes), then students will find and determine directly what the volume of these geometric shapes is by discussing with their partner.

In solving the problem of volume of geometric figures, students must understand the problem given by the teacher first, after understanding the problem then students make a solution plan such as what steps must be taken "determine first what the size of the ribs, length, width and height of build the space given by the teacher". Then they carry out the solution plan, in this case the students begin to carry out calculations according to the solution plan that has been made previously and in accordance with the problem given by the teacher. The final step is for students to re-examine the process and the results obtained.

These steps are in accordance with Polya's opinion in Susanto [20] the steps in problem solving consist of four steps, namely understanding the problem, planning a solution, implementing the solution plan by carrying out calculations, and checking the process and results again. In this research, researchers applied the bamboo dancing learning model to improve problem solving abilities. In implementing the bamboo dancing learning model, the teacher presents the learning material first and students pay attention to the teacher's presentation of the material. The presentation of material in cycle I was assisted by using rubik's media, and in cycle II using cardboard in the form of spatial shapes. Then after presenting the material, the teacher divides the

class into 2 or 4 groups. In cycle I the teacher divided the class into 2 groups, after reflecting on cycle I, in cycle II the teacher divided the class into 4 groups. After being divided into groups, all students line up in a row in front of the class and then face each other between the 2 groups. After that, the teacher gives a problem, starting from a real problem that uses space-building media that the researcher makes from cardboard and decorates using attractive colors to attract students' attention and enthusiasm to the problems in the worksheet.

After being given a problem, students discuss with their partner in front of them to solve the problem given by the teacher within a certain time. After the allotted time is up, students shift so they get new partners and return to discussing solving the problem. Shifts are made according to time and needs. By discussing between pairs, students appear more active and understand better how to solve the problems given by the teacher. This is in line with Vygotsky's theory in Al-tabany [4] which states that vigotsky believes that higher mental functions generally emerge in conversation and cooperation between individuals before the higher mental functions are absorbed into the individual. By discussing or collaborating with fellow students, students will understand something much better.

After completing the discussion, students take turns presenting the results of their work in front of the class and the teacher gives other students the opportunity to provide responses. And the final step is that the teacher facilitates questions and answers between students so that the knowledge gained becomes shared knowledge for the entire class. These steps are in accordance with the steps of the bamboo dancing learning model according to Suprijono [21]. Based on research from cycle I and cycle II conducted by researchers, it can be said that there has been an increase in students' abilities in solving mathematical problems in building space which has been improved by using the bamboo dancing learning model in class V D at State Primary School No 13/1 Muara Bulian. In cycle I, the results of observations of students' ability in problem solving were 61.01%, supported by written test results with classical completeness of 62.5%. In this first cycle, there are still many shortcomings in implementing the bamboo dancing learning model, including the teacher dividing the class into 2 groups, so that students are too difficult to manage because there are too many members, besides that the teacher also uses media that is not large enough because in the first cycle the teacher uses Rubik's media so that students are less interested and less enthusiastic. A lot of time is also wasted organizing students into groups, this happens because the teacher is unable to condition the class. The actual results have improved compared to before the bamboo dancing learning model was implemented. However, this increase did not meet the criteria for success of the action, namely ≥75%. So the researchers returned to planning and implementing cycle II by correcting the deficiencies in cycle I.

In cycle II, the results of observations of students' abilities in solving spatial geometric problems increased to 81.64%. which is supported by written test results with classical completeness of 83.33%. In cycle II, the results of teacher observations in implementing the bamboo dancing learning model also experienced improvements from the previous cycle. So it can be said that in cycle II, the results of observations and test results of students' abilities in solving spatial mathematical problems have exceeded the criteria for success of the action, namely ≥75%, so the cycle can be stopped.

The percentage of action achievements from observations of students' abilities in solving spatial problems has increased from cycle I to cycle II. Apart from that, the learning outcomes of students who are categorized as individually complete are achieving Minimum Completeness Criteria ≥65, namely 20 students, namely AD, ANK, ARW, BA, DP, DAS, GFA, IPD, KDK, KLA, KNA, KS, MF, MJA, MZ, NZ, NO, RK, VTPL, and WZ. Student learning outcomes are said to be classically complete if they reach ≥75% of the total number of students. In this study, student learning outcomes were classically completed, reaching 83.33% of the total number of students. Based on the results of observations and written test results, it can be concluded that the application of the bamboo dancing learning model can improve students' abilities in solving spatial problems in class V D State Primary School No 13/1 Muara Bulian.

The implications of this research are very significant in the world of education, especially in teaching mathematics at the elementary school level. The application of the bamboo dance learning model has proven to be effective in improving students' problem solving abilities, which indicates that creative and interactive approaches can replace or complement conventional teaching methods which tend to be monotonous. By integrating elements of art and movement, this model not only makes learning more interesting, but also helps students understand the concept of spatial structures more deeply and contextually. The success of this research could encourage educators to adopt similar methods in their curriculum, which could ultimately improve the quality of education and students' overall critical thinking abilities. In addition, the results of this research also provide insight for curriculum developers and educational policy makers to consider using innovative learning methods that combine various scientific disciplines to achieve better learning outcomes.

4. CONCLUSION

Based on the classroom action research that has been carried out, the researcher applies the bamboo dancing learning model to improve students' abilities in solving spatial problems in class VD State Primary

School No 13/1 Muara Bulian, in this research students are given a topic and material presentation by the teacher, then the students are divided into into 2 or 4 groups. All groups line up in front of the class and face each other. Then the teacher gives assignments starting from giving a problem in the form of a spatial construction medium that varies in each cycle which is then given to each pair to find out how long, wide, high and volume it is to the problems in the worksheet. Then students discuss with their partners to solve the problems given by the teacher within a certain time. After the discussion time with the initial partner is up, the students stand up again and move clockwise like a bamboo dance until they find a new partner. After getting a new partner, students return to discussing solving the problem given by the teacher. Shifts are made several times and adjusted to the time available. After completing the discussion, the teacher asks students to present or present the results of their work in front of the class in turn. The teacher provides opportunities for students who want to ask questions or provide responses. The final step is for the teacher to provide reinforcement so that there are no errors in understanding the material that has been studied. The research results obtained from observing problem solving abilities in cycle I were 61.01% and increased in cycle II to 81.64%. The results of the classical completeness written test in cycle I were 62.5%, and in cycle II it increased to 83.33%. From the results obtained, it can be concluded that the bamboo dancing learning model can improve students' abilities in solving mathematical problems.

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