

## **Improving Understanding of The Break of Triangle Concepts Through The Application of Bruner's Theory In Class IV Students of SDN 7 Kontunaga Kabupaten Muna**

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### **Abstrak**

*Bruner's learning theory is a teaching model developed based on a cognitive view of learning and constructivism where the contents of Bruner's theory is a student-centered learning approach with (1) an active stage; learning using concrete objects or real situations, (2) the iconic stage; presented in the form of visual images or images and (3) symbolic stages; write symbols related to symmetry of flat shapes, which are organized in such a way as to make students play an active role in learning. Students learn through active involvement with concepts and principles, and the teacher encourages students to gain experience by carrying out activities that enable them to discover concepts and principles for themselves. The purpose of this research is to improve understanding of the concept of the area of a triangle in class IV students at SDN 7 Kontunaga Kab. Muna through the Application of Bruner's Theory. The method used in this study was classroom action research by adapting the research design of Kemmis and Mc. Taggart. The research was conducted in two cycles. Each cycle consists of four stages of activity namely, planning, action, observation, and reflection. The source of the data in this study were research personnel consisting of students and teachers. The collection of data in this study is quantitative data and qualitative data consisting of learning achievement tests, observation results and interview results. Based on research data with the application of Bruner's theory, satisfactory results were obtained, namely in the pre-action 12 students (66.66%) received a low score, 6 students (33.33%) received an adequate score, and no student (0 %) who got good grades. In cycle I, out of 18 students who took the formative test, students who scored above 7.0 were 11.11% (2 people) with an average score of 4.72. In cycle II this increased, namely all students had obtained the lowest score of 7.0 with an average value of 7.5 were 100%. It is concluded that learning the Application of Bruner's Theory can improve understanding of the concept of the area of a triangle in class IV students*

**Keywords: Bruner's Theory, Broad Triangle Concept**

### **PENDAHULUAN**

Mathematics is one of the sciences developed in order to support students' reasoning power, to be able to understand the conditions around them. However, many cases show that mathematics is a subject that is still difficult for students to understand, especially in understanding the basic concepts of mathematics which results in low student achievement. This is caused by the conventional way of

teaching teachers. As revealed by Schonfield (Yuwono, 2001: 6) that teaching mathematics conventionally results in students only working procedurally and understanding mathematics without reasoning. Therefore, learning mathematics needs to be directed at the appreciation and experience of mathematics in the hope that students can master mathematics by learning mathematics in a meaningful way, namely understanding mathematics procedurally and conceptually.

However, in reality, there are still many teachers who present mathematical material as a finished product, the teacher immediately writes down mathematical formulas and immediately uses them in solving problems. In addition, students are less exposed to manipulative teaching aids, and teachers dominate teaching and learning activities more. In fact, what is important in learning mathematics is how to provide meaningful experiences that leave marks (Aaron, 1993: 5).

The above conditions make learning mathematics, especially in teaching geometry, not successful. Most students do not know why and for what purpose they are learning geometric concepts, because everything they learn feels far from their daily lives.

While the results of interviews with students, it was revealed that it was difficult to understand the concept and relationship of the side lengths of a triangle, it was difficult to determine a triangular shape, the teacher was less involved in manipulating concrete objects, some teachers used teaching aids for learning, but teachers often used lecture, question and answer methods and how to solve the problem, then proceed with the exercises.

From the learning conditions at SDN 7 Kontunaga, Muna Regency, the teacher seemed to use less concrete objects, paid less attention to the stages of presenting a mathematical concept in elementary school, and did not involve students in learning the area of a triangle but only by using the lecture method, question and answer, solving problems. -question.

Based on the situation above, it is necessary to find an alternative learning that is in accordance with the cognitive development of elementary school students who are in the concrete stage, attracts students' interest, motivates students, and relates it to the child's initial knowledge. As a teacher, you should try to find out and make use of the child's initial knowledge that already exists in the minds of students before they learn a new concept or experience. One type of learning that can provide opportunities for students to build their own knowledge actively is learning that is based on constructivism through the application of Bruner's theory which consists of three stages, namely the enactive representation stage, the iconic representation stage, and the symbolic representation stage.

In connection with the lack of application of constructivism learning through the application of Bruner's theory and assuming that this learning is relevant in learning Geometry, especially flat shapes, in this study researchers will apply this learning. This research was conducted using Classroom Action Research (CAR).

Based on the description in the background of the problem, it is necessary to conduct research with the title "Improving Understanding of the Concept of the Area of a Triangle Through the Application of Bruner's Theory in Class IV Students at SDN 7 Kontunaga, Muna Regency".

## **METHOD**

This research is a class action research (CAR). A distinctive characteristic of classroom action research is repeated actions to improve the teaching and learning process in the classroom. As expressed by Kemmis and Taggart (Wardani 2005: 16) who said that the action research process is a cycle or recycling process consisting of four fundamental aspects, starting from the aspect of developing a plan, then taking action according to the plan, observing action, and ends with reflection. The research setting was carried out in class IV at SDN 7 Kontunaga, Muna Regency. The subjects of this study were all fourth grade students at SDN 7 Kontunaga, with a total of 18 students consisting of 11 male students and 7 active female students. The research data is in the form of students' work on the questions given which include: (1) pre-test before the action, (2) results of interviews with research subjects and mathematics teachers, (3) results of observations during learning takes place, (4) results of notes field about learning activities related to action. There are two kinds of indicators of success in this study, namely indicators of the implementation of learning scenarios and indicators of students' understanding of mathematical concepts. The learning scenario is carried out well if the learning scenario is carried out thoroughly. Students who are the subjects of this study are said to understand the mathematical concepts being taught if all students who are the research subjects have obtained the lowest score of 7.0.

The action flow scheme implemented in this research can be seen in figure 3.1

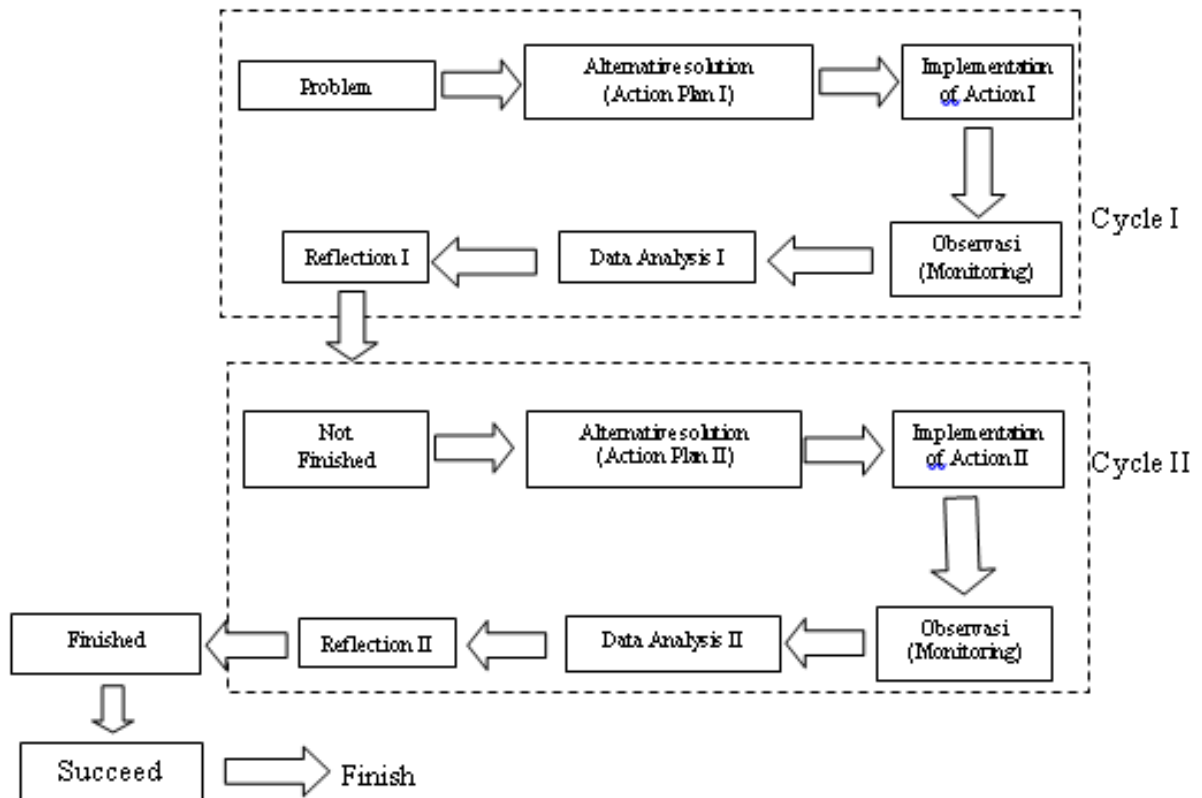


Figure 3.1 Stages of research, adapted from the PGSM Project Training Team (1999: 27)

## RESULTS AND DISCUSSION

### A. RESULTS

#### 1. View data before action

Before carrying out the research, the researcher coordinated with the class teacher who taught class IV at SDN 7 Kontunaga. The purpose of this coordination is to be allowed to carry out research in the class he leads. Furthermore, the researchers conducted interviews with fourth grade teachers who teach mathematics to find out and obtain information about their experiences in carrying out mathematics learning in fourth grade, especially in learning the concept of the area of a triangle. The next step, the researcher and the teacher discussed the schedule for carrying out the initial test, the implementation of cycle I actions and the preparation of the Classroom Learning program.

The learning action will end after the student becomes the subject having an understanding of the broad concept of a triangle, both conceptually and procedurally. In this regard, a lesson plan is prepared that includes the broad concept of a triangle. This learning is carried out with three stages of

presentation based on the application of Bruner's theory, namely the enactive, iconic and symbolic stages, which in its implementation are followed by all fourth grade students at SDN 7 Kontunaga.

## 2. Exposure of Cycle I data

Activities carried out in cycle 1 include planning, implementation, observation, and reflection.

Learning in cycle I aims for students to understand the learning objectives that have been set. The results of observations made by researchers who were assisted by 3 observers included evaluation of the process and evaluation of learning outcomes.

Process evaluation was carried out to find several facts from the research subject's activities, it was found that the subject enjoyed learning. Students do their assignments seriously, but there are still those who don't dare to express their opinions. In addition, it was also found that there were students doing other work while the discussion was taking place. This causes group members to fill in the LKS only based on their own understanding. Realities like this show that the process of implementing learning has not met expectations as desired by researchers.

Evaluation of results carried out at the end of learning. If seen from the test results obtained by students in cycle I did not show satisfactory results. Of the 18 students who took the formative test in cycle I, students who scored above 7.0 were 11.11% (2 people) with an average score of 4.72. While doing the test, there were 3 students who were the subjects who still had difficulty solving questions related to multiplication and division, namely LA, Sm and SA. The results of the students' work show that students have actually understood the concept of the area of a triangle with various representations, namely in the form of using props (concrete), pictures and symbolic forms.

Based on the results of the data analysis and reflection above and referring to the indicators of success, it was determined that the completeness of student learning in cycle I did not refer to the predetermined indicators of success, namely only achieving 11.11% or as many as 2 students who scored above 7. This caused, the teacher does not give motivation to students, so students pay less attention to the teacher's explanation. The teacher also does not check students' understanding after explaining the material through the iconic stage. In addition, students are still shy and afraid to ask the teacher. So the teacher does not know the difficulties experienced by students. Whereas in group discussions consisting of 3 groups only 1 group could complete the LKS well (33.33%), it was concluded that learning was still not successful.

By looking at the existing deficiencies and the results of the first cycle tests that have not reached the predetermined success indicators, this material needs to be repeated in the second cycle of action with some improvements as follows.

- a) The contribution of teaching aids has been prepared for each group by instructing each student to prepare their own teaching aids to be used in the learning process, so that as a whole students can be actively involved in demonstrating concrete objects.
  - b) The division into one group contains students with high, medium and low abilities and the number of groups from 3 groups to 4 groups.
  - c) Teachers should be more motivating to students so they don't hesitate to express opinions.
  - d) The teacher revises the lesson plans that have been made based on all the data collection tools used.
3. Exposure to Cycle II Data

Activities carried out in cycle II include planning, implementation, observation, and reflection.

Learning in cycle II aims for students to understand the learning objectives that have been set. The results of observations made by researchers who were assisted by 3 observers included evaluation of the process and evaluation of learning outcomes.

Process evaluation was carried out to find several facts from the research subject's activities, it was found that the subject enjoyed learning. This can be seen when students work on assignments seriously and are very satisfied with what they have obtained based on the thoughts and observations they have made. Ideas or thoughts are expressed freely and with high confidence, both representing the group and appointed by the teacher individually. Collaboration in groups has been carried out well, because each group respects the opinion of its friends in formulating the problems it faces and answering questions from other groups. In filling out the LKS, each group no longer experiences difficulties, because students have adapted to the questions on the LKS and this activity has been carried out repeatedly.

Evaluation of results carried out at the end of learning. If seen from the test results obtained by students in cycle II, it has shown satisfactory results. This can be seen in the test results which showed a significant increase from cycle I tests, cycle II tests, to the final cycle test. From the test results in cycle I, students who scored above 7.0 already had 2 students (11.11%) with an average score of 4.27. In cycle II this increased, namely all students had obtained the lowest score of 7.0 with an average value of 7.5. The results of the students' work show that students have understood the concept of the area of a triangle with various representations, namely in the form of using visual aids (concrete), pictorial and symbolic forms.

Based on the results of the data analysis and reflection above and referring to the established indicators of success, the results of the cycle II test showed an increase or in other words the specified success indicators had been achieved because all students who were the subject of the study had obtained

the lowest score of 7.0. Judging from the results of group discussions consisting of 4 groups, they were able to complete the LKS well, it was concluded that the learning had been successful. Thus the learning objectives have been achieved.

## **B. DISCUSSION**

Before carrying out the learning activities in this study, an initial test was carried out. This initial test was conducted to find out the prerequisites or basic knowledge of students about the area of a triangle. From the results of the pre-test, information was obtained that there were still students who did not understand the prerequisite material well, especially students with middle and lower abilities. The lack of students' understanding of the prerequisite material was caused by previous learning patterns. The pattern of learning that has been carried out so far has been more on the transfer of knowledge from teacher to student. Teachers dominate learning more by explaining material, while students are more often good listeners or note takers of teacher explanations. The teacher explains concepts/principles, gives examples, and finally gives exercises. As a result of this learning, most students tend to memorize so that the knowledge received is easily forgotten. This is in accordance with Katona's opinion (Orthon, 1992: 103) that rote learning tends not to produce results. In addition, students can only remember simple facts.

Preliminary test results are one of the criteria in determining research subjects and forming small groups. The small group consists of 6 students. Each group consists of students with heterogeneous abilities. The formation of this group is intended so that in learning there will be communication between students and students and between students and teachers which is commonly called multi-way communication. Furthermore, it is said that small group discussions allow students to share information and experiences in solving problems. In addition, the formation of groups is intended to facilitate and observe student activities in the learning process. This is in accordance with the opinion of Yuwono (2001: 16) that the observation of student behavior in group discussions is also used as an assessment in learning through the application of Bruner's theory.

In accordance with the lesson plan that has been prepared both the lesson plan in cycle I and the lesson plan in cycle II, the presentation of this activity material goes through 3 stages, namely the enactive stage, the iconic stage, and the symbolic stage. This is in line with what was revealed by Bruner (Aisyah, 2007: 9) that the presentation of mathematics is suggested to start with an enactive presentation, then iconic and lastly symbolic. First, in the enactive stage, students manipulate concrete objects around them, so that students will discover the concept of the area of a triangle by themselves. In the second iconic stage, students manipulate images of concrete objects that are used to discover the

concept. In the third symbolic stage, students manipulate symbols directly to determine the concept of the area of a triangle. Through these three stages, students are guided to shape what they have learned.

Bruner's learning model allows students to learn with an understanding that can be adapted to the level of student development. In addition, through this learning can make students not burdened in learning the material, because they feel that their freedom of thought is valued. In addition, all activities carried out by students are only directed and given guidance as necessary. This is in accordance with the opinion of Suparno, (2001: 44) which states that the knowledge students acquire during learning is the result of the formation of the students themselves.

Through learning the enactive stage, the iconic stage, and the symbolic stage students are directed to gain an understanding of the area of a triangle both conceptually and procedurally. Sutawidjaja (Latri, 2004: 82) says that conceptual knowledge refers to understanding concepts, while procedural knowledge refers to skills in performing algorithms or working procedures. Both types of knowledge must be interrelated and need to be mastered by students.

In addition, this learning is seen as quite optimal in helping to achieve learning objectives. This can be seen from the results obtained by students from each cycle showing an increase. In addition, the learning atmosphere takes place actively, students are full of enthusiasm in learning, and most students are happy with the learning model applied.

In applying Bruner's learning theory, the use of visual aids is an important element that can make it easier for students to understand abstract mathematical concepts. The visual aids used are concrete so that they are easier to manipulate with students' hands so that it makes it easier for students to recognize the concept being studied. Thus students will more easily understand abstract mathematical concepts in a simpler way. Experience in direct contact with the tool will provide a kind of binding for the mathematical concepts represented by the teaching aids used.

In learning activities, students work in groups by manipulating concrete objects, namely cardboard cutouts that are rectangular or triangular in shape and various triangular shapes (triangular tangram). The activity carried out by students in groups was cutting rectangular cardboard into two equal-sized triangles, then pasting the two triangular cardboard cutouts with rectangular cardboard cutouts. After that, it is continued by making a triangular figure on the grid paper and students counting the number of unit cubes or squares in the triangular figure. Before carrying out the activity as described above, the teacher first explains that in calculating the unit cubes or plots in the triangular image there are rules, namely if the unit cube is less than half of the unit cube shape, it indicates that the unit cube is not enough. counts, but if half or more than half of a unit cube is included in the count. Besides being able to create a pleasant experience for



students, this activity can also involve students physically and mentally in learning so that students can build their knowledge. Experience in direct contact with the object of learning is very important. In this way, students can go through the process of constructing knowledge in the form of concepts, ideas, or understanding of something they are studying.

From the activities carried out by students in contact with teaching aids, students consciously interpret the mathematical patterns contained in these concrete objects. In addition, students feel that the activities carried out in cutting cardboard in the form of rectangles or triangles are also playing while learning. Feelings of satisfaction and pride are experienced by students when students find patterns in the teaching aids, so that broad concepts can be discovered by students themselves. Thus, students will more easily remember the concepts, ideas, and understanding they have learned.

In addition to the use of visual aids, there are other things that should not be ignored in learning, namely the use of worksheets in each lesson with the aim of being able to help students' understanding of the problems posed by the teacher. In addition, worksheets can help teachers direct students' thinking towards the appearance of the expected answers. With the LKS students find it helpful to know the steps that must be taken in solving the problems they face. Even so, LKS does not guide students absolutely. LKS only provides outline steps to see student understanding after the concrete teaching aids are no longer in front of them. Students are given the freedom to express concepts, ideas, and their understanding and creativity based on what they have done through teaching aids in finding the formula for the area of a triangle. Thus, students form their own knowledge actively with the help of worksheets.

The questions posed in the LKS can open students' minds so that they avoid getting stuck in answering questions. Questions are structured in such a way according to the student's cognitive structure so that they can direct the flow of students' thoughts towards an expected response. This is done with the aim that students can learn meaningfully.

The activities carried out by students to determine the area of the triangle shown through the pictures on the LKS are related to the mental images of the objects they manipulate. Before this activity is carried out, the teacher first checks the understanding that students have after manipulating concrete objects by asking various questions. Apparently, the students had no difficulty in answering the questions posed by the teacher. This means that the mental image of the material being studied using concrete objects already exists in the minds of students. In other words, students already have initial knowledge about the concept of the area of a triangle and that is obtained from learning experience through concrete objects, so that when they see a picture of a triangle it immediately blends into the pattern that is already in students' minds. This kind of learning process is an

assimilation process. According to Wardhani (2000: 18) assimilation is the process of understanding new objects or events related to existing schemes.

After that, students continue their activity by observing the triangles in the LKS to see ideas that are interrelated in the concept network shown through the picture. Then, students filled out the LKS by following the available work steps based on the table previously worked out in finding the formula for the area of a triangle.

As the final step to optimize students' understanding of the concept of the area of a triangle, students are given the opportunity to solve practical questions symbolically to make generalizations so that a pattern is obtained which is expressed in a general form called the formula for the area of a triangle. The provision of practice questions is in line with the opinion of Hudojo (1988: 105) that after understanding is obtained, students need sufficient practice so that they have the opportunity to reorganize or restructure experiences related to the concepts being studied.

The teacher's role in completing LKS activities is as a motivator, mediator, and facilitator. The teacher encourages students to always work together, help each other overcome difficulties, and respect each other's opinions. The teacher also always provides guidance as needed to students who experience difficulties. The teacher tries to make the students themselves construct their knowledge through cooperation and mutual discussion.

During the learning process it is always observed and reflected. From the results of the analysis and reflection, it was found that the learning process in cycle I was not optimal, partly due to the fact that there were still some students who were silent or carried out other activities during the discussion. This situation is possible because students are not used to carrying out learning with the atmosphere and learning environment that is applied. In addition, the division of groups consisting of 6 people per group has not gone as expected, this is because the number of members is too large so that only a few students are active in discussions or in other words the discussions are only dominated by high-ability students. and moderate abilities.

Another factor that causes less optimal group learning in cycle I through the application of Bruner's theory is the lack of students' courage in expressing opinions. This is especially the case for students with less ability, who are completely unmotivated and accustomed to expressing opinions. Because learning through the application of Bruner's theory involves students actively in the learning process, student readiness is an important factor for the implementation of this learning properly. Students who are lacking must get more attention from the teacher, so that they are motivated to actively participate in the learning process.

Based on the conditions above, in cycle II activities, especially in the distribution of groups, it is necessary to arrange according to the level of ability

possessed by students based on the acquisition of formative test results in cycle I. With the division of new groups and the motivation given by the teacher, cooperation between students in groups has been show progress. Each group member began to show activeness in discussing and solving group problems. Students with high abilities actively provide guidance to fellow students, while students with medium or low abilities try to find and understand group answers. Good cooperation in the group is in accordance with the opinion of Slavin (1997: 270) which states that the use of study groups with diverse abilities can support changes in concepts.

When working in groups, all groups try to convey their opinions verbally, either in the form of answers or suggestions and questions. They also try to respect each other's opinions or different answers in discussions, so as to obtain a group agreement.

Based on the results of the process evaluation in each lesson, it shows that basically most students feel happy and look active in the learning process. Meanwhile, based on the results of the final test in each cycle, students' understanding of the concept of the area of a triangle through the application of Bruner's theory shows a significant increase as evidenced by the increase in student achievement. This can be seen in the results of the first cycle of formative tests, the second cycle of formative tests and overall the final cycle test. This shows that there is a learning process, where there is a change in behavior in students which is the effort and experience carried out by students, Sadiman (Arsat, 2007: 37).

## **CONCLUSION**

Based on the formulation of the problem, the results of data analysis and discussion, the results of this study can be concluded that learning through the application of Bruner's theory can improve understanding of the concept of the area of a triangle in class IV students at SDN 7 Kontunaga, Muna Regency. This learning is carried out in three stages, namely the initial stage, the core stage and the final stage. Activities in the early stages include: (1) preparation of facilities related to learning activities, (2) asking questions related to the material to be studied, (3) informing the main material to be studied, (4) conveying learning objectives, and (5) ) divide students into groups. While the core stage activities consist of (1) enactive stage, (2) iconic stage, and (3) symbolic stage. While the final stage includes (1) making conclusions on learning material, and (2) providing an evaluation.

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