

The Effectiveness of Scientific Approach Based Guided Discovery Learning Model to Improve Student Learning Outcomes

Wiratno Surahmat^{1✉}, Mukh Doyin², Amen Yusuf²

¹ SDN Magersari Rembang, Jawa Tengah, Indonesia

² Pascasarjana, Universitas Negeri Semarang, Indonesia

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Abstract

The purpose of this study was to improve student learning outcomes in mathematics about the circumference and area of flat shapes in class IV SDN Magersari with the Guided Discovery Learning model (GDL) based on Scientific Approach (SA). Type of this research is classroom action research or penelitian tindakan kelas (PTK) with 2 cycles action in this study. Data collection technique was used observation, test, and documentation. The research compared the SA-based GDL learning model to the learning outcomes of fourth grade mathematics with the number of students, namely 25. For indicators of achieving student success, 75% was classical. The results of cycle 1, there were 18 students who completed with a percentage of 72%, but in cycle 1 students still had difficulty doing the final test. Then the results of cycle 2, there were 21 students who completed with a percentage of 84% of the results of the evaluation of cycle 1 in the final test of cycle 2 students mastered the material more. There was an increase of 12% from cycle 1 to cycle 2, which means that the research succeeded in exceeding the classical completeness indicator. Based on the analysis, can be concluded the SA-based GDL model can improve the student learning outcomes in the mathematics subject at fourth grade student.

✉ Correspondence address:

Street. Nusa Indah No 27, Magersari Rembang, Central Java 59254

E-mail: wiratnosu94@gmail.com

INTRODUCTION

In the 21st century, Indonesia is using the 2013 curriculum at every level of education. The government through the Ministry of Education and Culture declares that human resources are not only smart but must have a good attitude for nowadays. Referring to the statement above, there must be an enhancement in the uses of the learning model, the learning methods, strategies or learning media so that students will have good learning outcomes.

According to Ngaeni & Saefudin (2017) effective learning will train and instill a democratic attitude for students, effective learning will also create a fun learning environment so that it can foster students' creativity to be able to learn with their maximum potential.

Achieving these goals can be done with various efforts through learning innovations, especially by teachers so as to provide direct experience to students, so that students gain knowledge through a learning process that provides meaningful learning experiences and is held interactively, is fun, motivates, and challenges students to Active participation. Based on Ngaeni and Saefudin (2017) Learning will run effectively if the experience, materials, and expected results are in accordance with the students' goals and level of maturity. Then provide sufficient space for creativity, independence, talents, results and psychology of students, so that teachers can maximize the potential of students and make learning more meaningful.

Based on the preliminary study, the learning research currently taking place in SDN Magersari, especially in grade IV, uses the lecture model more in the learning process. Not only that based on observations of research in class, the use of existing media in schools is very limited so that the meaningful process of learning activities has not occurred. In addition to the media model of a learning can also affect student learning outcomes, learning models that have minimal activeness and meaningful activities such as trying or asking students will

make learning feel boring, teachers only use speaking as the capital of students listening to learning will feel less active and meaningful.

An explanation of the use of the learning model above, it can be concluded that the teachers in these schools, especially the fourth grade teachers, dominate learning using the lecture method. From the results of the preliminary study and observations of research in the class of student learning outcomes of 25 students, it turned out that 14 students had not achieved the Minimum Completion Criteria (KKM) and seemed bored at the time of learning so that students were less focused in these learning activities because someone was found drawing in their writing books even though not a lesson in Cultural Arts and Crafts (SBDP), there are also some students who are busy chatting with friends during the lesson. Some even got sleepy when the lesson took place and many students often took permission to go to the bathroom.

Various facts in the field ultimately lead to less conducive learning conditions resulting in low learning outcomes. Students prefer interactive, communicative, and fun learning so that there is interest in learning the material. According to Widianono & Harjono (2017) claim that interactive learning model emphasizes on the student questions as its characteristic. While the use of finding-based learning models is expected to improve student learning outcomes, especially in grade IV SDN Magersari. Based on Septiana (2017) states that teachers have 4 aspects, namely the role of teachers in the aspects of learning planning, including being innovators and learning designers. In the aspect of implementing learning, the teacher's role includes being a learning manager, motivator, mentor, initiator and facilitator. Then in the aspect of learning assessment, the teacher has a role as an evaluator. Whereas in the aspect of supervision, the teacher acts as the implementer and guarantor of the achievement of the standard content of learning. In the guided discovery method, the teacher acts as a facilitator who guides students through questions that lead

students to connect past knowledge with the knowledge they are gaining. Students are encouraged to think for themselves, analyze themselves, so that they can find concepts, Principles. In addition, according to Ramdhani (2017) an active learning process can affect the development of individual attitudes.

Due to Setiawan (2019), he states that generally, the scientific approach is composed of several sequential activities, namely observing, asking questions, gathering information, conducting experiments, processing data and communicating results. Therefore, the research hopes that in scientific learning students will have broader insights.

In this study, the guided discovery learning model based on the scientific approach will be applied. This model is the result of the development of Guided Discovery Learning (GDL) with a design based on a scientific approach. The reason for using this model is because this model is often used by students, but sometimes students only arrive in terms of observing, there is no follow-up from the teacher or the students themselves. Hopefully it will make it easier and train students in finding answers on their own.

According to Purwaningrum (2016) that discovery learning based on scientific approach is defined as learning in small groups that guides students to find a concept using a scientific approach through stages, namely: (1) stimulation or stimulation, (2) problem identification or problem statement, (3) data collection, (4) data processing, (5) verification, (6) generalization or drawing conclusions. With a scientific approach (1) Observing, (2) Asking, (3) Gathering information, (4) Associating and (5) Communicating. Students will be more enthusiastic in learning and will not feel bored or bored.

Based on, Rochani (2016) states that GDL is a learning model which is more dominant in active learning during classroom. Furthermore, it feels free to explore in seeking information about the subject matter which is being studied and the teacher is only a facilitator. And familiarize students with

problem solving activities, it is hoped that the ability to solve various problems will increase such as students' cognitive abilities.

The material to be used in the GDL model based on Scientific Approach (SA) is about the circumference and area of a rectangular shape and a rectangle for class IV mathematics. Studying mathematics is not only understanding the concept or the procedure, but there are many things students can learn from learning directly with the environment. According to Gazali (2016), learning that relates to problems that are close to the daily life of students (contextual) due to with Akbal (2015) where the meaning of learning will be obtained if students seek, find and experience for themselves various things related to learning material. Therefore, teachers must be able to help students provide meaning in learning mathematics and build students' cognitive abilities to deepen their understanding of mathematics subjects.

The purpose of this study is to improve student learning outcomes, especially in the material perimeter and area of square and rectangular shapes.

METHOD

The research method is Classroom Action Research (PTK). According to Stephen Kemmis and Robyn McTaggar, one cycle consists of four main steps, namely planning, acting, observing and reflecting.

The data collection techniques, was used observation, test, and documentation techniques. Observations was made by the research in order to record all events and activities that occur during the research. Then, test was done to measure student learning outcomes in mathematics subjects. While the documentation technique was used to collect all document such as images of student activity, writing assignment, and etc as an evidence in this research. The data collected in this study is quantitative data in the form of figures then described as percentages.

The planning stage contains complete guidelines for the process of implementing learning, in which there are lesson plans and learning media that will be delivered during the learning process. The implementation stage contains the treatment that will be applied based on the plans that have been compiled at the time of planning. The observation stage consists of gathering information related to the implementation process carried out by research in the learning process. Through information, observation so that the results can be input at the reflection stage. The content reflection stage looks at any shortcomings when the research takes action to improve the next cycle.

According to Saregar (2016) these four stages are repeated into the next cycle until the problem at hand can be resolved and consistent results are obtained.

Meanwhile, the research used a research instrument, namely a test to measure the success of students in the subject of mathematics.

The subjects of this study were 25 students, with 15 female students and 10 male students. The indicator of success in this study is 75% of completing completeness with a KKM score of ≥ 64 . Individual completeness is achieved if students meet the KKM, namely 64, to determine their completeness, a test will be given in the measurement.

RESULTS AND DISCUSSION

At the observation stage research used Mid-Term Assessment (PTS) 1 to determine KKM in pre-cycle. The research found that in the Mid-Term Assessment (PTS) 1 for mathematics subject, more than half of number of students grade IV got score below the KKM. So that research decided to conduct a research on class IV. The results of the pre-cycle in this research can be seen in the Table 1.

Table 1. Pre-Cycle

Completeness	Frequency	Presentation
Completed	11 students	44%
Incompleted	14 students	56%
Total	25 students	100%

This research was conducted by following the model of PTK Kemmis and Taggart. In the first cycle students were divided into 5 groups with each group having 5 members. By using the guided discovery learning model based on the scientific approach, students still feel strange and confused about what to do. Therefore, the student is still noisy and cannot be conducive at the beginning of learning. After that the research learning used a model *Guided Discovery Learning* based on scientific approach, the meaning scientific approach is learning in small groups that guides students to find a concept with a scientific approach, namely observing, asking questions, gathering information, associating, and communicating. In the cycle 1, the research found that there was an increase of students who were achieved the KKM. After the research had conducted the final test of learning, the students felt that they understood the material given. It was proven that some students had achieved the KKM. However, the class condition in the cycle 1 was still not conducive.

The research used the GDL model based on a scientific approach in the cycle 1 in order to increase student learning outcomes. But the researcher still found difficulties using the GDL model based on scientific approach at student. It happened because the students still did not understand the procedure of the model. Moreover, they played more and chit-chatted among group members. Therefore, they got no points on the discussed materials. The results of the Cycle 1 in this research can be seen in the Table 2.

Table 2. Test results in Cycle I

Completeness	Frequency	Presentation
Completed	18 students	72%
Incompleted	7 students	28%
Total	25 students	100%

Figure 1 was one of the student test results in the first cycle. The student got score of 80 in which questions number 1 up to 5 got the maximum score. Some Students were able to answer questions with several steps. However, in the cycle 1 there were still many obstacles

experienced by students. The students who were still confused with the GDL model based on the scientific approach. In Figure 1 the students have been able to work on the questions, it is proven that the students are able to answer the questions in different ways and get the maximum score. Students have done it in three different ways and also answered correctly.

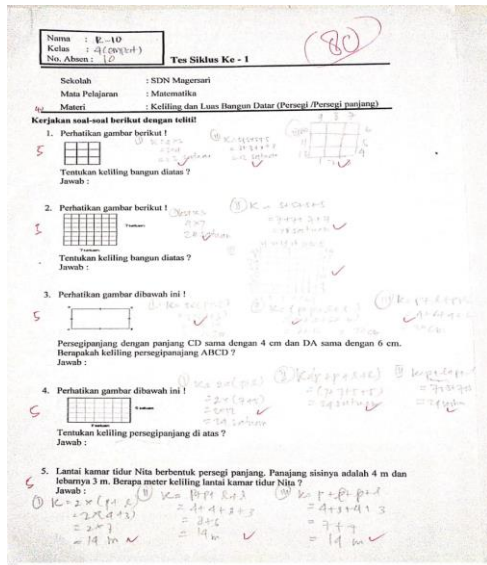


Figure 1. Examples of student test results (R-10) in cycle 1

The work on the next answer sheet results is not satisfactory, there are still many question numbers that only get a score of 3 with less than maximum results, it can be seen in the results of the test cycle 1 students can only answer in one way, less thorough and hasty so the final test results not maximal. Students are often provoked by friends who have finished working first, this can cause panic in students which makes them not focus on doing test questions. This process is an important note for research who will continue to the next stage of the cycle. Students experience a learning process that is less than optimal, as a result students get bad final test results. This is because students are distracted by other friends who have finished doing the test. Meanwhile, another factor that causes students to lose focus is boredom, according to Wahyuni (2018) boredom is a mental condition in which a person feels overwhelmed by extreme boredom to do routine

tasks he has been doing for a long time. Routine tasks that are meant to be a learning process using the lecture method of students listening then students are asked to do without any detailed explanation. Figure 2 shows the results of the students' answers that were not maximal in working on the test questions.

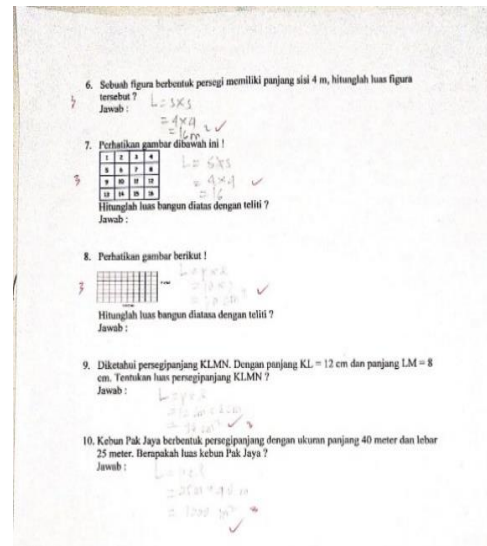


Figure 2. Examples of student test results (R-10) on the second sheet in cycle 1

In this cycle students better understand the use of the guided discovery learning model based on scientific approach and the class is not noisy like in cycle I, they are more accustomed and more focused. At cycle II, the research added the help of projector media and active speakers. As a result students become more motivated because during the learning process students are more active, asking each other questions with other groups, and answering questions with the arguments of each group. So the learning outcomes in cycle II were higher, meaning that learning in cycle II had a significant increase in students who completed so that the scientific approach based GDL learning model succeeded in increasing students who completed in the first cycle more in the second cycle. The increase occurred because in cycle II students were able to master the learning material and already understood using the GDL learning model based on scientific approach,

research conducted an evaluation in the first cycle of the learning process so that the final test results in cycle II were better and improved, but there were still some students who still not complete in carrying out the final test. This means that learning in cycle II saw a significant increase in students who completed so that the GDL learning model based on scientific approach succeeded in increasing students who completed in the first cycle more in the second cycle. The increase occurred because in cycle II students were able to master the learning material and already understood using the GDL learning model based on scientific approach, research conducted an evaluation in the first cycle of the learning process so that the final test results in cycle II were better and improved, but there were still some students who still not finished in carrying out the final test. This means that learning in cycle II saw a significant increase in students who completed so that the GDL learning model based on scientific approach succeeded in increasing students who completed in the first cycle more in the second cycle. The increase occurred because in cycle II students were able to master the learning material and already understood using the GDL learning model based on scientific approach, research conducted an evaluation in the first cycle of the learning process so that the final test results in cycle II were better and improved, but there were still some students who still not finished in carrying out the final test. The results of the Cycle II in this research can be seen in the Table 3.

Table 3. Test results in Cycle II

Completeness	Frequency	Presentation
Completed	21students	84%
Incompleted	4 students	26%
Total	25 students	100%

From the table, it was obtained a significant increase in completeness from cycle I to cycle II, namely 12% of the students who achieved the presentation. This increase can be a reference for a learning model to teach the circumference and area of a rectangular and

rectangular shape, therefore an increase in each cycle is presented to see the improvement from cycle I and cycle II, the scientific approach based GDL learning model is very suitable for use in students. high-grade elementary school students who are used to thinking independently. It is hoped that students can develop their academic abilities with this model so that students have future provisions for the next level of education. The research hopes that other teachers to be able to develop students' creative thinking skills, students must also get used to practicing more actively to develop creative thinking skills. The learning model is also very influential on students' creative thinking skills. Innovative learning based on the constructivist paradigm helps students to internalize, reshape, or transform new information. research also use media so that students understand better the learning process According to Nurhafizah (2018) learning media functions not only as a means to make learning fun, but also helps children understand something abstract. The results of the increase in each cycle in this research can be seen in the Table 4.

Table 4. The results of the improvement test in each cycle

Completeness	Pre-cycle	Cycle I	Cycle II
Completed	11 students	18 students	21 students
Incompleted	14 students	7 students	4 students
total	25 students	25 students	25 students

The increase in students who completed in the cycle II indicates that students are accustomed to the GDL model based on the scientific approach. The research also found that the student's test result enhancer (R-10) got a score of 92, seeing the results of the student's work (R-10) was very good at doing it marked by getting the maximum score from question number 1 to question number 5. GDL learning model based on scientific approach made fun learning activities so that the students were more

active in learning. Moreover, the students felt the ease in learning mathematics. Based on Mailani (2015) she claims that fun learning is a learning where the atmosphere of learning process is created not to make students afraid of mistakes. Moreover, the students are not afraid to be laughed at, they are not afraid of being trivialized, they dare to try, to act, to ask question, to express opinions and especially they dare to question other people's ideas. Meanwhile, according to Wardhani (2017) the material and mathematical concepts taught must be adjusted to the abilities and thinking stages of the child concerned. The research found that in the second cycle, students were more focus to work. The results showed that the score obtained was higher than the previous cycle. It can be seen in the picture 3. In the second cycle, the research felt that when student learning was easier to focus and very conducive. This right is marked by the results of the student test (R-10) getting a score of 92.

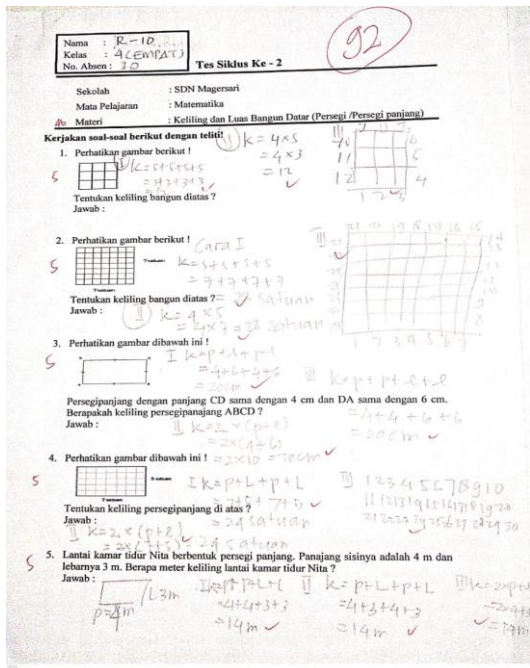


Figure 3. Examples of student R-10 test results in Cycle II

There is a significant comparison of the answers as seen in Figure 4. The results of the second sheet R-10 student test in cycle II after the second treatment got a score of 5 for 3

correct questions and a score of 3 for 2 correct questions. Students master the material more so that the grades in their work increase, not only that students' thinking skills also increase. Students are more accustomed to answering in several ways to complete work, this is what research expect in addition to learning outcomes to increase students' creative thinking skills, research also develop creative thinking skills in elementary school students. The test result of the student's R-10 in the Cycle II can be seen in the Table 4.

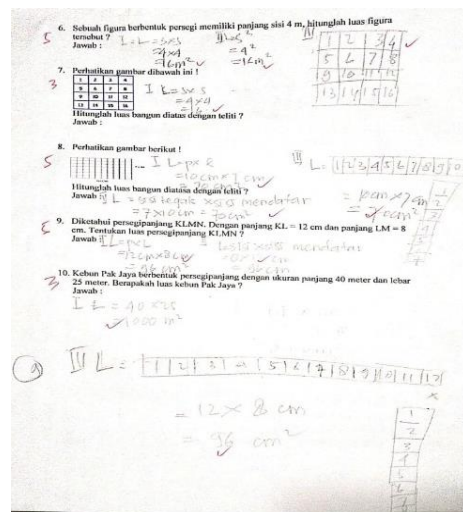


Figure 4. Examples of second sheet R-10 student test results in Cycle II

As seen in Figure 4, the Students experienced a lot of changes and improvements in learning outcomes by means of the GDL learning model based on scientific approach. They worked more effective or they were able to do something new contrast with what their teacher taught. Creative thinking is a mental activity related to sensitivity towards a problem, considering new information and unusual ideas with an open minded, and can draws relations interms of solving a problem, Moma (2015). Meanwhile, according to Abdurrozak et al (2016), a student can be said to be creative if he can solve problems with his own ideas or ideas and generate new ideas or ideas. This is the basis for differences with other research, teachers also rarely or even almost never use students' creative

thinking skills to solve a problem in classroom learning.

CONCLUSION

The conclusion of this research is that learning using the GDL model based on scientific approach (SA) can improve the learning outcomes of fourth grade students of SDN Magersari in learning mathematics about the circumference and area of square and rectangular shapes. Learning will also be more effective when learning using the GDL model which is based on a scientific approach, students are more happy because learning mathematics is not burdened. This is evident in each cycle that has increased and the students' KKM has been achieved in mathematics.

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