

# Group Investigation to Improve Science at Primary School

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## ABSTRACT

This study aims to improve science learning through the Investigation Group learning method in grade VB SDN Gedongkiwo, Kec. Mantrijeron, Yogyakarta. This type of research is a Classroom Action Research which is carried out in two cycles. The action is carried out in six stages, namely; 1) selecting topics and organizing students into groups, 2) planning assignments to be studied, 3) carrying out investigations, 4) preparing final reports, 5) presenting the final reports, and 6) evaluating. The action of Investigation Group Learning make provides opportunities for students to experience more meaningful learning, so that students experience an increase in learning outcomes. The results of this study indicate that the Investigation Group learning method can improve student learning outcomes. In cycle 1 the average science learning outcomes reached 75.61 with a percentage of learning completeness of 57.13%. In cycle 2 the class average score increased to 80.95 and the percentage of completeness increased to 90.47%.

**Keywords:** Group investigation, Science, Classroom action research, Primary school

## 1. INTRODUCTION

Education is a state effort to develop human resource potential for the advancement of the nation itself. Through good education, intelligent and quality human resources can be produced so that they can improve the standard of living and be able to compete with other nations. Education level starts from elementary school. Natural Science is one of the subjects taught in elementary schools. The Natural Science learning process carried out at the elementary school level requires teachers as roles or drivers of the learning components. The teacher's task in determining learning methods affects the success of the goals to be achieved. Based on the results of teacher observations, students must understand all the many science lessons by rote theory. So that learning activities have not provided opportunities for students to gain direct experience and build their own concept of the material being learned. This results in very minimal experience in building knowledge of primary school students who are at the concrete operational

stage. The learning that is carried out becomes less meaningful because students have the opportunity to discover for themselves the concept of the science material being studied. This can be seen from the results of the Middle Semester Test for the 2016/2017 Academic Year of a large number of students who score below the Minimum Mastery Criteria (MMC). MMC which is applied to science lessons SD Negeri Gedongkiwo, Kec. Mantrijeron, Yogyakarta is 75. Of the 21 students, only 4 (19.04%) passed the MMC and 17 (80.95%) children scored below the MMC with a class average score of 62.28. The learning that is carried out becomes less meaningful because students have the opportunity to discover for themselves the concept of the science material being studied. This can be seen from the results of the Middle Semester Test for the 2016/2017 Academic Year of a large number of students who score below the Minimum Graduation Criteria (MMC). MMC which is applied to science lessons SD Negeri Gedongkiwo, Kec. Mantrijeron, Yogyakarta is 75. Of the 21 students, only 4 (19.04%) passed the MMC and 17 (80.95%) children scored

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According to Robert E. Slavin, the Group Investigation (GI) learning method provides students the opportunity to seek information from various sources both inside and outside the classroom [1]. Sources such as (various books, institutions, people) offer a series of ideas, opinions, data, solutions or positions related to the problem being studied. GI is a cooperative learning method that encourages students to collect information to solve problems and activate students' high-order thinking skill (Kronberg and Griffin, 2000). The Group Investigation (GI) learning method provides opportunities for students to be actively involved in discovering concepts and building their own knowledge through systematic and scientific steps.

The purpose of this classroom action research is to improve the learning outcomes of Natural Sciences through the Group Investigation learning method in class VB SD Negeri Gedongkiwo Kec. Mantrijeron, Yogyakarta City.

This research is expected to provide benefits to increase the contribution of treasured data for theory development in the world of education regarding the application of the Group Investigation learning method to improve the learning outcomes of Natural Science . Increase students' understanding of the concepts in science subjects. The results of this study can provide experience and knowledge in applying the Group Investigation method to improve science learning outcomes in grade V SD Negeri Gedongkiwo. The results of this study are expected to be used to

improve the quality of learning at SD Negeri Gedongkiwo. The results of this study can be used to determine the increase in science learning outcomes through the Group Investigation method in class VB SD Negeri Gedongkiwo.

Learning outcomes are changes that cause humans to change in Winkel's attitude and behavior. Learning outcomes are abilities possessed by students after receiving a learning experience [2]. Learning outcomes are new behavior changes after going through the learning process. Acquisition of aspects of behavior change depends on what is learned in this case by students.

Student learning outcomes are the culmination of the learning process. these learning outcomes occur mainly thanks to teacher evaluations [3]. states that the process of assessing learning outcomes can provide information to teachers about progress in achieving their learning goals through learning activities [4]. Therefore, the assessment of learning outcomes has an important role in the learning process.

Based on the opinions of the experts above, learning outcomes are changes in human abilities as a result of the learning process so that their knowledge increases both cognitive, affective, and psychomotor. According to Bloom learning outcomes are divided into 3 (three) domains, namely [5]:

- a. Cognitive domain: thinking ability, competence to acquire knowledge, recognition, understanding, conceptualization, determination and reasoning.
- b. Psychomotor domain: competence to do work involving limbs; competences related to physical movement.
- c. Affective domain: relates to feelings, emotions, attitudes, the degree of acceptance or rejection of an object.
- d. Learning outcomes can be seen from whether there are changes in the changes in the three domains experienced by students after undergoing the learning process.

Learning outcomes can be seen from the measurement results in the form of evaluation, in addition to measuring learning outcomes, assessment can also be shown to the learning process, namely to determine the extent of student involvement in the learning process. The better the learning process and the activeness of students in following the learning process, the higher the learning outcomes obtained by students should be in accordance with the previously formulated goals.

Natural Science learning outcomes are changes in human abilities as a result of the learning process so that their knowledge about natural phenomena that arise in the form of facts, principles and concepts that are cognitive, affective, and psychomotor in nature increases. Science learning outcomes referred to in this study are the results of changes in abilities achieved from learning activities that can be measured by means or tests in science learning.

The development of learning models and methods must be adapted to the development stages of students. The development of students' abilities will adapt to their developmental tasks in both cognitive, affective and psychomotor aspects. An understanding of the characteristics of students is one of the bases in developing a learning model, so that the desired goals are achieved properly.

Generally, grade 5 elementary school children are 10-11 years old. Based on Jean Piaget's theory, grade 5 elementary school children occupy the concrete operational stage. The characteristics of the high class in elementary schools have the following characteristics:

- a. The existence of practical daily interest in concrete, this gives rise to a tendency to compare practical jobs.
- b. Very realistic, have high curiosity and want to learn.
- c. Towards this time children are interested in things that are special.
- d. At the age of 11 years, children need teachers or parents to complete their assignments and after 11 years of age the children have started completing their tasks freely and on their own.
- e. At this time, children perceive report card scores as an appropriate measure of school achievement.
- f. Children begin to like to form peer groups, usually able to play together. In games, children usually are no longer bound by traditional rules, but are able to create their own rules.
- g. The role of human idols is very important, in general, parents, older siblings, are considered as perfect human idols. Children also think of teachers as human beings who are all year round.

From some of the opinions and theories that have been expressed above, it can be said that grade V SD children are around 10-11 years old. So they are at the concrete operational stage, which builds new knowledge by thinking logically and discussing with peers. So that teachers must provide facilities and

opportunities for students to build their own knowledge.

The Group Investigation method is one type of learning in the Cooperative Learning model. This method emphasizes students to work together in a high sense of social dimension in classroom learning to face problems. Classroom in Group Investigation is a place of creativity to work together where teachers and students build a learning process based on their respective experiences, capacities and needs to encourage maximum student engagement.

According to [6] there are several important elements or elements so that the Group Investigation learning method can be implemented properly. These elements are as follows [1]:

### ***1.1.Mastering Group Abilities***

This phase is known as the phase of laying the groundwork or building a team. As the name suggests, Group Investigation is suitable for integrated study projects such as mastery, analysis, and synthesizing information in an effort to solve multi-aspect problems. Academic assignments should provide opportunities for group members to make various contributions, and should not be designed to simply be biased to answer factual questions (who, what, when, etc.). Slavin gave an example, for example in biology learning Group Investigation would be ideal for teaching about rainforests, but not suitable for teaching the elements of the periodic table [1].

In general, the teacher designs a broad topic, in which the students then divide the topic into subtopics. As part of the investigation, students sought information from various sources both inside and outside the classroom. Sources such as (various books, institutions, people) offer a series of ideas, opinions, data, solutions, or positions related to the problem being studied. The students then evaluate and synthesize the information contributed by each group member in order to produce the group work.

### ***1.2.Cooperative Planning***

It is important for students to plan cooperation in sharing tuagas in cooperative learning. Group members take part in planning the various dimensions and demands of their project. Together students determine what their investigations want to solve the problems they face regarding what resources they need, who will do what, and how they will present their completed project to the front. Cooperative planning skills should be introduced gradually to

students and trained in a variety of situations before the class undertakes a full-scale investigative project. The teacher can play a role in leading the discussion by generating ideas.

### **1.3. Teacher's Role**

In a classroom that implements the Group Investigation method, the teacher acts as a resource and facilitator. The teacher goes around the existing groups to see that students can manage their assignments, and helps with any difficulties they face in group interactions, including problems in performance on specific tasks related to the learning project. The most important role of the teacher is to build communication and social so that it can facilitate students when students carry out investigations. There are many opportunities for teachers to assist students such as; listening, making phrases, giving non-judgmental reactions, encouraging participation and so on. The teacher can thus provide direct instruction to the entire class,

The teacher must add to the subtopic investigations that students learn, this can be done at the beginning, during the group investigation process or at the end. For example, in a class that will study the adaptation of living things to their environment the teacher must first explain that every life has the ability to adapt to its environment as an introduction, then students focus on topics they think are interesting.

### **1.4. Group Investigation Implementation Stage**

In Group Investigation, students work through six stages. The description of the GI method steps according to the stages designed by [6] is as follows:

#### **1.4.1. Stage 1: Selection of Topics and Organizing Students into Groups**

- a. Students choose various subtopics on a common problem that the teacher describes in advance.
- b. Students join their groups to join groups of 2 to 6 people.
- c. The group composition is based on student interest and must be heterogeneous
- d. The teacher facilitates the arrangement.

#### **1.4.2. Stage 2: Planning The Task to be Study**

Students plan together about: What we will learn, How we will learn, Who does what (assignment). In

this stage students and teachers plan various task-specific learning procedures, and general goals that are consistent with the various topics and subtopics that have been selected as in the steps above.

#### **1.4.3. Stage 3: Carry Out An Investigation**

- a. Each student collects information and carries out the assignment planned in the previous step using a wide and varied source of both inside and outside the classroom.
- b. Each student contributes to the efforts of the group
- c. The teacher continuously follows the progress of each group and provides assistance if needed.
- d. The students exchange, discuss, clarify and thesis all the ideas obtained.

#### **1.4.4. Stage 4: Preparing The Final Report**

- a. Group members determine essential messages from the various information obtained from their project in the previous step.
- b. Group members plan what they will report, and how they plan the summary in an interesting presentation to the class.

#### **1.4.5. Stage 5: Presenting The Final Report (Presentation of Learning Outcomes)**

- a. All groups present interesting presentations on various topics that have been studied.
- b. Students who are not presenting must actively listen / pay attention to the group presenting.
- c. The listeners evaluate the clarity and appearance of the presentation / give responses to the group of presenters in turn in sequence.

#### **1.4.6. Stage 6: Evaluation**

The teacher and students evaluate the topics that have been investigated and regarding the implementation of the tasks that have been done. Evaluations can include each student individually or in groups or both.

## **2. RESEARCH METHODS**

The type of research used in this research is an approach in the form of classroom action research or in English it is called Classroom Action Research (CAR). CAR is part of action research that Kurt Lewin introduced in 1994 [8].

According to Kemmis and Mc. Taggart, action research is a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social of educational practice, as well as their understanding of these practices and the situations in which these practices are carried out [7]. So Action Research is a collective reflective thought process carried out by participants in certain social situations in order to increase the rationality and fairness of social and educational practices and to increase their understanding of ongoing practices and situations [9].

## 2.1 Type of Research

The research approach used in this research is an approach in the form of classroom action research. CAR is an action research conducted in class with the aim of improving / improving the quality of learning practices. in his class. Classroom action research (CAR) focuses on the class or the teaching and learning process that occurs in the classroom, not on class input (syllabus, material, etc.) or output (learning outcomes) [7].

## 2.2 Research Time and Place

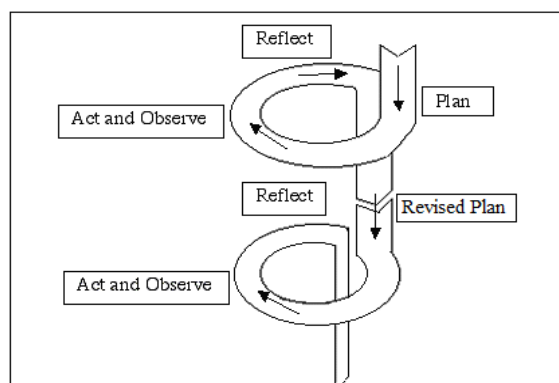
The research was conducted in the odd semester of the 2016/2017 academic year which was held in November-December 2016.

## 2.3 Research Targets / Subjects

In this study, the research subjects were students of class VB SD Negeri Gedongkiwo, Kec. Mantrijeron, Yogyakarta for the 2016/2017 academic year, amounted to 21 children consisting of 11 boys and 10 girls.

## 2.4 Research Procedures

The research procedure used in this study was the Spiral Kemmis and Mc Taggart model. Broadly speaking, there are four stages that are usually passed, namely (1) planning, (2) acting and observing, and (3) reflecting [5]. This research activity begins with preparation and ends with making a report [7]. This research activity is planned through several cycles. The research procedure design used is as follows.



**Figure 1** The CAR cycle of Kemmis & Taggart [3]

To conduct CAR, teachers identify their problems or areas for improvement, and address them through the practices of inquiry, action, reflection, and sharing [10]. Action research (AR) is defined as "...a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which their practices are carried out" [7]. Each CAR cycle are as follows: Planning, observation and action, reflection. In this study, the research took place in two cycles. In cycle 1 students have experienced an increase but have not reached the Minimum Mastery Criteria.

Classroom action research is a very effective way of improving your teaching. Assessing student understanding at mid-term helps you plan the most effective strategies for the rest of the semester. Comparing the student learning outcomes of different teaching strategies helps you discover which teaching techniques work best in a particular situation. Because you are researching the impact of your own teaching, you automatically take into account your own teaching strengths and weaknesses, the typical skill level of your students, etc. Your findings have immediate practical significance in terms of teaching decisions.

"Student learning outcomes are properly defined in terms of the knowledge, skills, and abilities that a student has attained at the end (or as a result) of his or her engagement in a particular set of higher education experiences"[11].

## 2.5 Data, Instruments, and Data Collection Techniques

The research instrument is a tool used by researchers in collecting data so that their work is easier and the results are better. The research instrument is a tool that the researcher prepares before conducting the research that the researcher will use to

collect research data to make it easier for researchers to carry out research. The instruments in this study were test questions and observation pieces. The observation sheet consisted of the teacher's implementation and students' involvement in carrying out the group investigation method.

## 2.6 Data Analysis Techniques

Data collection techniques are the most important step in research, because the main objective of this study is to obtain data [5]. The data collection techniques used in this study were observation and tests. The observation used in this research is structured or controlled observation, because this observation technique includes what aspects or symptoms need to be considered at the time the observation is made. In this case the observer uses blanks or content guidelines that have been prepared [7]. The observation sheet in this study consisted of two instruments, namely, teacher observation sheets and student observation sheets. The type of test used in this study is an achievement test which is used to measure a person's achievement after learning something.

## 3. RESEARCH RESULTS AND DISCUSSION

This action research was conducted in two cycles. Each cycle is carried out in two meetings. The implementation of learning in the first cycle of the first meeting was held on November 17, 2016, the second meeting was held on November 22, 2016. The material presented in the implementation of Natural Science learning in cycle I is Animal Adjustment to the Environment which includes the form of animal adjustment to food, the adjustment of animals in protecting themselves from enemies and the adjustment of animals to their habitat.

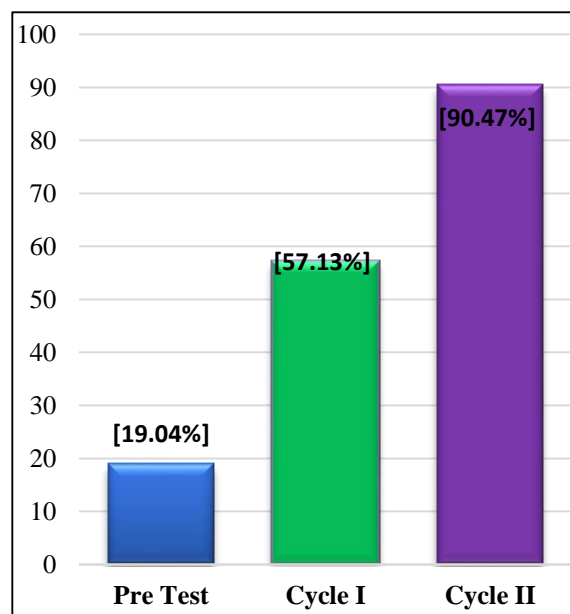
Of the 21 students who took the Natural Science learning outcomes test after the action (posttest) cycle I, 1 student (4.76%) was in the very good category, 11 students (52.38%) were in the good category, 9 students (42.85%) in the sufficient category, no students (0%) in the poor category, and none (0%) in the very poor category. Based on these results, 9 students (42.85%) had not yet reached the MMC standard ( $\geq 75$ ). This shows that students who have obtained complete scores above the MMC have only reached 12 students (57.14%) of a total of 21 students.

The implementation of learning in the second cycle of the first meeting was held on November 24, 2016 and the second meeting was held on November 29,

2016. The big topic of material presented in this implementation is the Adjustment of Plants to Their Environment. This material consists of two subtopics namely; Specific Characteristics of Plants in Self-Protection and Adjustment of Plants to Their Habitat. The implementation of Natural Science learning through the Group Investigation method in class VB students of SD Negeri Gedongkiwo Mantriheron Yogyakarta for the 2016/2017 academic year.

Of the 21 students who took the Natural Science learning outcomes test after the second cycle posttest, 5 students (23.81%) were in the very good category, 14 students (66.67%) were in the very good category, and 2 students (9.52%) were in the sufficient category. Based on these results, as many as 2 students (9.5%) had not yet reached the MMC standard ( $\geq 75$ ). This shows that students who have obtained a complete score above the MMC reached 19 students (90.47%) of a total of 21 students. The data of the second cycle of Natural Science learning outcomes test has shown the success of grade VB students of SD Negeri Gedongkiwo Mantriheron Yogyakarta in implementing Natural Science learning through the Group Investigation method, which has reached more than MMC ( $\geq 75$ ).

Based on the test of learning outcomes in Natural Sciences which was carried out in the first cycle (posttest), and after the second cycle (posttest), the comparison of the learning outcomes was obtained as follows:



**Figure 2** Comparison diagram of pre-action learning outcomes, cycle I and cycle II

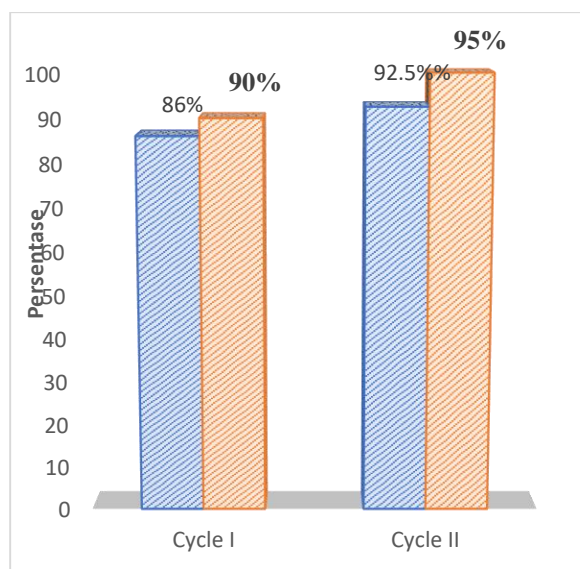


From the table and graph above, it can be concluded that the completeness of the learning outcomes of grade VB students of SD Negeri Gedongkiwo Mantrijeron Yogyakarta in the subject of Natural Sciences through the Group Investigation learning method has increased from pre-action to cycle I as much as 38.09%. while from cycle I to cycle II an increase of 33.34%.

Based on the observation data, the implementation of the teacher through the group investigation method from the posttest cycle I meetings 1 and 2 to cycle II meetings 1 and 2 experienced an increase as follows.

Based on the data from the observations of the teacher's implementation above, the implementation of learning science through the group investigation method in the first cycle meeting 1 was 86% (very strong), the first cycle meeting 2 was 90% (very strong), the second cycle meeting 1 at 92.5% (very strong) and the second cycle meeting 2 at 95% (very strong). From the results of the percentage of the four meetings in the two cycles, it can be concluded that the researcher acting as the teacher has carried out the learning activities of Natural Science through the group investigation method properly, namely the interpretation of the assessment of the score for the implementation of research actions is very strong.

Based on the observation data, students' involvement in learning Natural Sciences through the group investigation method from after the action (posttest) cycle I meetings 1 and 2 to cycle II meetings 1 and 2 experienced an increase as follows.



**Figure 3** Diagram of the results of student observation on learning natural science through the group investigation method cycle I and II

Based on the graph of the observation results of the VB class students' observations in implementing Natural Science learning through the Group Investigation learning method above, it can be seen that student learning implementation in cycle I meetings 1 and 2, amounted to 78%, 83% increased in cycle II meetings. 1 and 2 become 84% and 90%. The average percentage of student learning implementation in the first cycle was 80% with the interpretation of the score criteria in the strong category. While the average percentage of cycle II was 87% with the interpretation of the score criteria in the category of learning implementation was very strong.

#### 4. CONCLUSION

Based on the results of the research and discussion described in the previous chapter, it was concluded that the Group Investigation (GI) method could improve the learning outcomes of Natural Science class VB students of SD Negeri Gedongkiwo Mantrijeron Yogyakarta for the 2016/2017 academic year. The increase in learning outcomes occurs from the implementation of pre-action, cycle I to cycle II as follows; The mean score of the UTS score in the first semester indicates that the students' learning outcomes in science are low. It is proven that the average new class reaches 62.28, with the percentage of completeness is 19.04%; In the first cycle, science learning was carried out through the group investigation method, the class average value increased to 75.61, while the percentage of completeness increased to 57.13%; In cycle II, with the improvement of science learning through the group investigation method with better student conditioning, the clarity of the teacher in explaining the worksheets, using media in apperception activities, motivating students to be more courageous and confident in asking questions and motivation to work together with all members of the group student learning outcomes in science subjects increased. The class average score increased to 80.95%, while the percentage of completeness increased to 90.47%. To motivate students to be more courageous and confident in asking questions and motivation to work together with all members of the group, student learning outcomes in science subjects increase. The class average score increased to 80.95%, while the percentage of completeness increased to 90.47%. To motivate students to be more courageous and confident in asking questions and motivation to work together with all members of the group, student learning outcomes in science subjects increase. The class average score increased to 80.95%, while the percentage of completeness increased to 90.47%.

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