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THE EFFECTIVENESS OF GROUP INVESTIGATION-BASED DISCOVERY LEARNING MODEL WITH THE HELP OF CONCRETE OBJECTS ON STUDENT'S SCIENTIFIC THINKING ABILITY

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Abstract

This study aims to describe the effectiveness of discovery learning model based on group investigation with concrete objects on students' scientific thinking skills. The type of research used in this case is an experiment with true experimental design and posttest only control design. This research was conducted to 60 students of class VIII SMPN 1 Jetis Ponorogo. This study used multiple choice tests and questionnaires as data collection instruments. The student test data were analyzed quantitatively using the two-tailed and one-tailed t-test. Based on the results of the two-tailed t test, the value of 0.011 <alpha was obtained, which means that there are differences in the scientific thinking ability of the experimental and control classes. Then from the results of the one-tailed t test, the value of 0.006 <alpha is obtained, which means H_0 is rejected and H_1 is accepted so can be concluded that the scientific thinking ability of experimental class students which use discovery learning and group investigation with concrete objects is better than the control class. This research can be used as a reference for educators in implementing active learning with discovery learning and group investigation models that can improve students' scientific thinking skill.

Keywords: scientific thinking skill, discovery learning model, group investigation

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INTRODUCTION

Natural Sciences is one of the disciplines that is very influential on the development of technology. Poedjadi stated that current technological developments began with trial and error (trial and error) activities that require theoretical support and discoveries for practical purposes. Technology is a solution to the problems experienced by society. Technology starts with existing problems and is then solved by implementing scientific concepts and principles. Natural Sciences is concerned with a series of activities regarding natural events in a systematic manner. So in science it does not only contain a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. This science process skill is equipped with a scientific attitude to find out and demonstrate evidence of a principle or concept. The scientific attitude used in carrying out the process in science always involves scientific thinking. (Sayekti, n.d.)

Scientific thinking greatly influences a person in carrying out an action. Someone who has good scientific thinking skills will not easily believe in something without authentic scientific evidence. Someone who has good scientific thinking skills is also able to solve the problems he faces well. The reason is that in solving a problem, a person uses accurate data and forms of action. (Wulandari, 2016)

Based on interviews conducted by researchers with one of the junior high school science teachers in Ponorogo, it is known that the students' scientific thinking ability is in the moderate category. When students are asked about a scientific problem, these students still need to explore further information to answer problems based on scientific concepts. To support and develop the scientific thinking skills of junior high school students, it is necessary to apply another learning model, namely discovery learning and group investigation.

This study will discuss the effectiveness of the group investigation-based discovery learning model with the help of concrete objects on students' scientific thinking skills.

Discovery learning is a learning model that involves student participation in organizing the material being studied by prioritizing the discovery of principles and concepts that were previously unknown independently. (Faberta et al., 2019) Meanwhile, Group investigation is a cooperative learning that provides opportunities for students in groups to conduct an investigation on a particular topic. (Mawardi, 2015)

This research combines discovery learning and group investigation models with the help of concrete objects. Learning that combines discovery learning and group investigation models supports students to take an active role in teaching and learning activities so that students will better understand the problems discussed. In addition, group investigation which involves group work can improve communication and argumentation skills in order to solve problems. (Mayasari, 2016) The help of concrete objects used can also provide more stimulation for students to involve their senses in learning activities and can be seen in real terms. . (Maharani, Bekti Yuni, Hardini, 2017) This will make it easier for students to solve a problem. From the explanation above, the researcher will conduct research on the effectiveness of the group investigation-based discovery learning model with the help of concrete objects on students' scientific thinking skills.

METHOD

Research Design

The experimental design used is a true experimental design with a posttest only control design. The research procedure begins with the control group, applying learning by using discovery learning and group investigation only. While the experimental group applied discovery learning model based on group investigation with the help of concrete objects. After the learning process, the control and experimental groups were given a test to determine the difference in their scientific thinking abilities.

Research Target

The research was conducted at SMPN 1 Jetis Ponorogo with a population of all students of class VIII SMP Negeri 1 Jetis Ponorogo as many as 5 classes with a total of 254 students. The sample in this study was selected by cluster random sampling consisting of individual groups. (Syahrum & Salim, 2014) This study used a sample of class VIII students of SMPN 1 Jetis Ponorogo in the even semester of the 2020/2021 academic year. The number of samples used in this study were 60 students who were divided into control and experimental groups. 30 students as the experimental group and another 30 students as the control group.

Data Collection Technique

The instruments used in this study were test sheets and questionnaire sheets. The test instrument is in the form of questions containing the excretory system material. This question uses indicators that refer to scientific thinking skills such as interference, analysis, inquiry, and argumentation. The form of the question is

multiple choice. While the questionnaire used in this study contains several statements to determine student activities during the learning process using a group investigation-based discovery learning model with the help of concrete objects.

Data collection in this study began with determining the control and experimental classes. The control class will be taught using discovery learning and group investigation models, while the experimental class will be taught using discovery learning based on group investigation with the help of concrete objects. After learning in the experimental and control classes, the next step is to give a test to measure their scientific thinking skills. Before being tested on the two classes, the test questions have been tested for validity and reliability and have met the valid and reliable criteria. The data obtained from the results of further research will be analyzed quantitatively with the help of the minitab application.

RESULTS AND DISCUSSION

Scientific thinking is a reasoning process that is based on certain forms or patterns as well as systematic intermediaries. In the process of scientific thinking, a person needs certain techniques or stages in sequence that will produce good scientific knowledge. The techniques or successive stages in scientific thinking are referred to as the scientific method. This scientific thinking ability can later be used to solve a problem. The stages are understanding the problem, planning a solution to the existing problem, conducting a scientific investigation, and concluding the results of the investigation in order to obtain a solution to the problem at hand. (Wulandari, 2016)

Scientific thinking skills can be trained on students through discovery learning learning models. Discovery learning is a learning model that involves student participation in organizing the material being studied by prioritizing the discovery of principles and concepts that were previously unknown independently. This model is designed systematically so that students are able to find knowledge independently through scientific investigation activities. (Faberta et al., 2019) In the learning process, students are encouraged to identify independently what they want to know. Furthermore, students are encouraged to collect information and then organize the knowledge they have found independently. The main characteristic of this model is that students are involved in exploring and solving problems, combining and generalizing knowledge, students are very active, and involve learning by combining knowledge that students already know with new knowledge. (Hidayati, 2016) The stages of the discovery learning model include stimulation, problem identification (problem statement), data collection, data processing, verification, and generalization. (Hidayat et al., 2019)

Group investigation is a cooperative learning that provides opportunities for students in groups to conduct an investigation on a particular topic. Group investigation is also a learning activity that has a democratic nature which is manifested in a cooperative form in the form of group discussions. The group in this study consists of several members to investigate a problem solving process. The syntax in designing learning using group investigation consists of 5 stages including presenting problems that are able to interest students, explaining and describing reactions in situations, formulating tasks and organizing learning, performing tasks, and analyzing processes and developments. (Mawardi, 2015)

The research was carried out by applying a group investigation-based discovery learning model with concrete objects in the experimental group. Meanwhile, the control group studied using the discovery and group investigation model only. After that, each experimental and control group was given a posttest. The results of this posttest will be analyzed quantitatively to determine its effectiveness. Based on the results of the two-tailed t test with the help of minitab, a p-value of 0.011 was obtained, which was smaller than alpha (0.05) so that H_0 was rejected and H_1 was accepted. So it can be seen that there is a difference between the experimental group that applied learning using the discovery learning model and the group investigation with the help of concrete objects and the control group which applied learning using the discovery learning and group investigation model only. Then from the results of further tests using the one-tailed t-test, it was found that a p-value of 0.006 was smaller than 0.05 (alpha), so H_0 was rejected and H_1 was accepted.

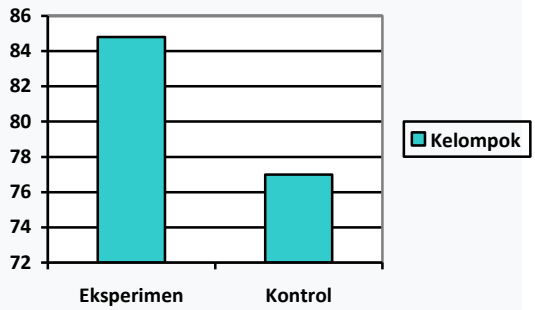

Figure 1. The average value of the experimental and control groups

From Figure 1, it is known that from the results of the tests that have been carried out, the data obtained the average value of the experimental group is 84.8. While the test score data obtained from the control group is 77. So it is known that the scientific thinking ability of students who apply discovery learning model based on group investigation with the help of concrete objects is higher than the scientific thinking ability of students who apply learning using discovery learning models based on group investigation. just. In conclusion, the discovery and group investigation models with the help of concrete objects are effective in improving the scientific thinking skills of junior high school students with the theme of the excretory system.

Students in the learning process go through many stages in discovery learning and group investigation that involve scientific thinking. These stages include stimulation or providing stimulation in the form of daily problems, problem identification, information collection, experimentation or conducting experiments, data processing and drawing conclusions. The discovery learning model does emphasize the abilities possessed by students to construct concepts and carry out discovery activities. The stages in such learning are able to develop students' scientific thinking skills the better. (Wulandari, 2016) Group investigation also plays a role in increasing students' scientific thinking skills. This is in line with Indah Panca Pujiastuti's research which states that learning that integrates group investigation with guided inquiry based on lesson study can improve students' scientific work. (Pujiastuti, 2016)

In addition to applying the discovery model, group investigation is also applied. Group investigation is a learning strategy designed in such a way that students are able to work in teams to solve problems and develop investigation or research skills. Each team will be given a task on a topic, divide the tasks, and carry out research on the topic that has been determined. (Pujiastuti, 2016) In this case, the students in the experimental group were formed in groups so as to allow cooperation, especially in carrying out proof activities in the form of conducting a simple experiment of exhaling in front of a mirror and blowing lime water until it became cloudy.

Learning that combines discovery learning and group investigation models supports students to take an active role in teaching and learning activities so that students will better understand the problems discussed. In addition, group investigation involves group work that can improve communication and argumentation skills to solve problems. (Mayasari, 2016) The help of concrete objects used can also provide more stimulation for students to involve their senses in learning activities and can be seen in real terms. (Maharani, Bekti Yuni, Hardini, 2017) This will make it easier for students to solve a problem. In this way, students' scientific thinking skills are expected to develop. Hariyanto (2017) in a journal entitled The Effectiveness of Mind Mapping Assisted Discovery Learning Models also states that the discovery learning model has a fairly good effect on the quality of learning so that student learning achievement will also increase. (Zuwariyah & Irawan, 2021)

The ability to think scientifically greatly influences a person in carrying out an action. Someone who has good scientific thinking skills will not easily believe in something without authentic scientific evidence. Someone who has good scientific thinking skills is also able to solve the problems he faces well. The reason is that in solving a problem, a person uses data and forms of accurate action. Therefore, the skills and knowledge acquired and applied are more memorable and meaningful in the brain so that they can be used in solving problems faced in the future. (Wulandari, 2016)

CONCLUSIONS AND SUGGESTIONS

Conclusion

The scientific thinking ability of the experimental group that applied discovery learning based on group investigation assisted by concrete objects was higher and got an average score of 84.8. Meanwhile, the control group that applied discovery learning and group investigation only got an average score of 77. So it can be concluded that the discovery learning model based on group investigation assisted by concrete objects is effective in improving students' scientific thinking skills.

Suggestion

This research can be used as a reference for educators in implementing active learning through simple experimental activities using objects around them. Scientific activities in the form of experiments conducted by students as in this study will be able to improve scientific thinking skills for the better.

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